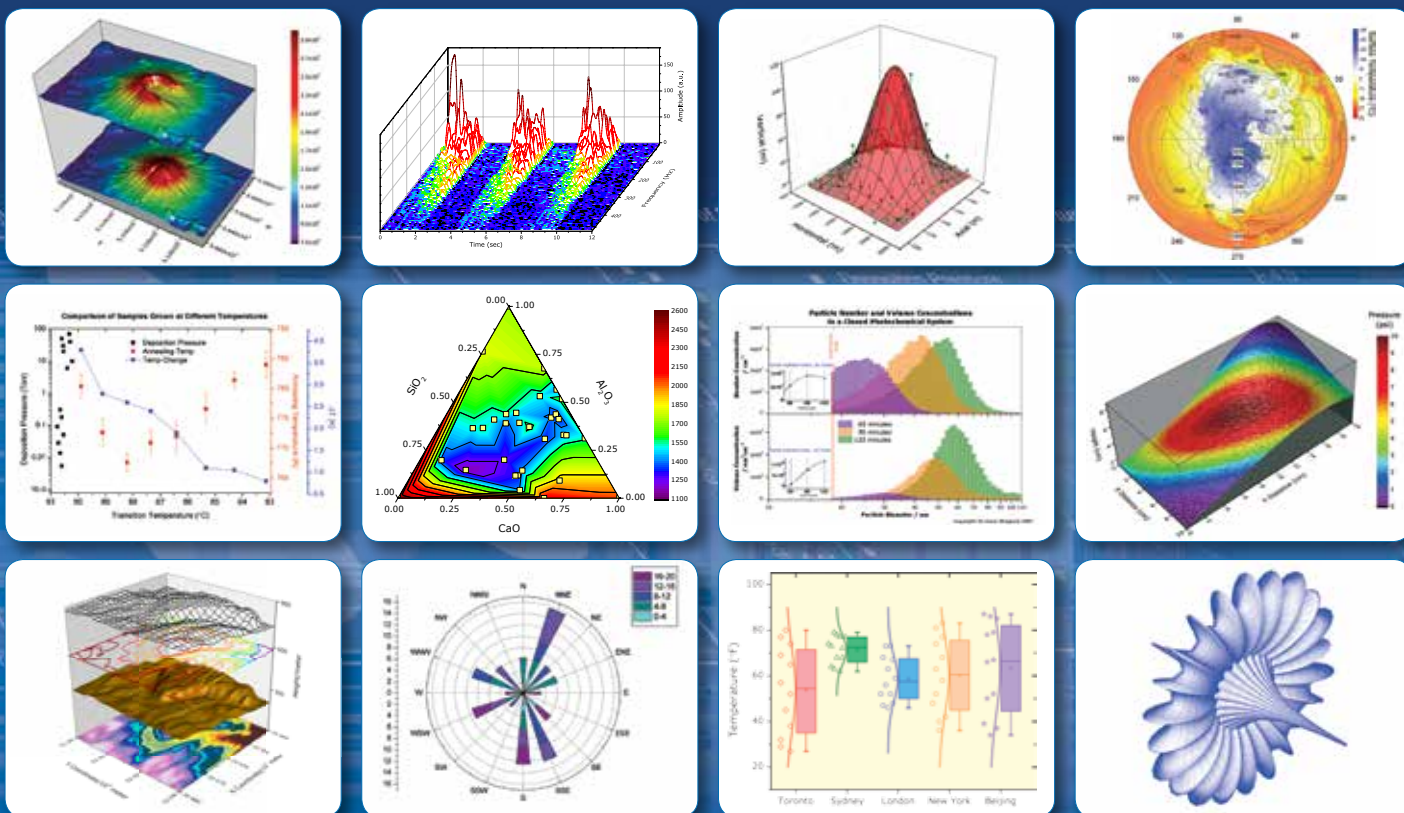


ORIGIN[®] 9

Data Analysis and Graphing Software



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Twenty years serving the scientific and engineering community.

ORIGIN[®] 9 The Pathway from Data to Results

Origin is a user-friendly and easy-to-learn software application that provides powerful data analysis and publication-quality graphing capabilities tailored to the needs of scientists and engineers.

OriginPro offers all of the features of Origin plus extended analysis tools for Peak Fitting, Surface Fitting, Statistics, Signal Processing, and Image Handling.

What sets Origin apart from other applications is the ease of interaction and customization of all operations ranging from importing to graphing to analysis, and the ability to automatically update all results and reports on data or parameter change.

Import, Query, Connect

Import data from ASCII, CSV, Excel or Third-Party data files.

Query database, or send data and commands to Origin from client applications such as LabVIEW[™], MATLAB[®], or Excel.

File Import ASCII, CSV, Excel, Third Party File Formats

Database Access

Database query

Query setup

- Query Builder
- SQL Editor

LabVIEW[™] Sub VIs

COMPATIBLE WITH LabVIEW

MATLAB[®] Console

Multisheet Workbook with Metadata Label rows and Sparklines

Graph, Explore

Create and customize publication quality graphs with ease, save customization as template or theme for repeat use. Explore data graphically including easy zoom and scroll within layers.

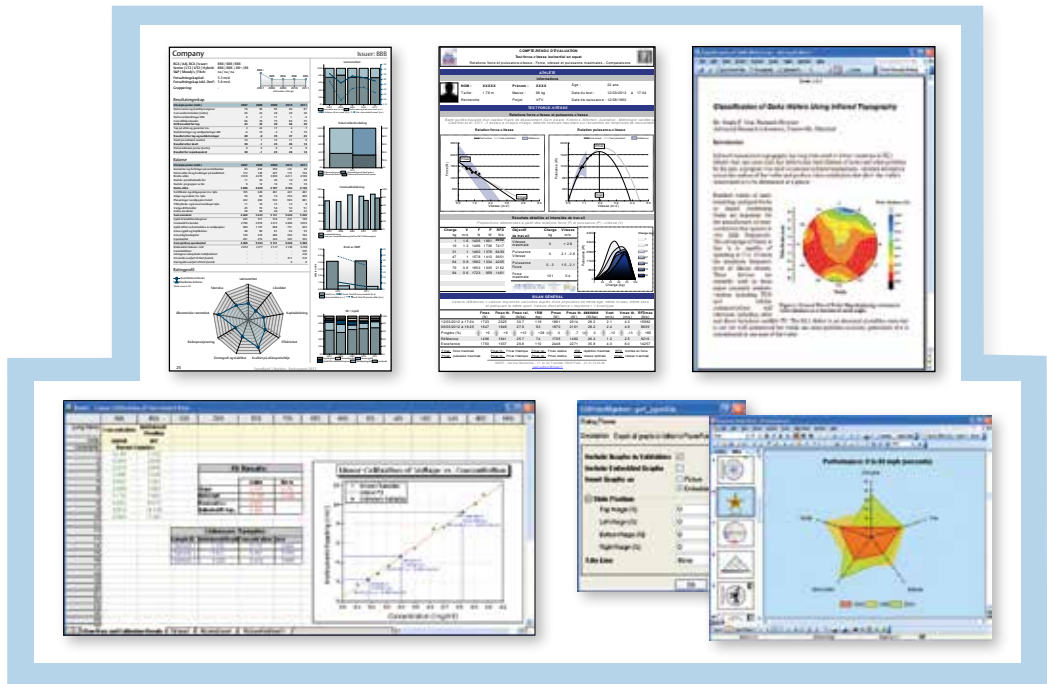
The Data Info tool lets you explore data from your graph, including display of related information from other columns.

“Yet again Origin and OriginPro 9.0 upholds its foremost status as the best purposeful and all-embracing data analysis and graphing software on the market. Although other software packages exist, few are as straightforward to use, flexible, and high-quality when it comes to performing challenging data analysis or creating publication superior graphs.”

Keith J. Stevenson, Professor of Chemistry, The University of Texas at Austin

Publish, Present, Report

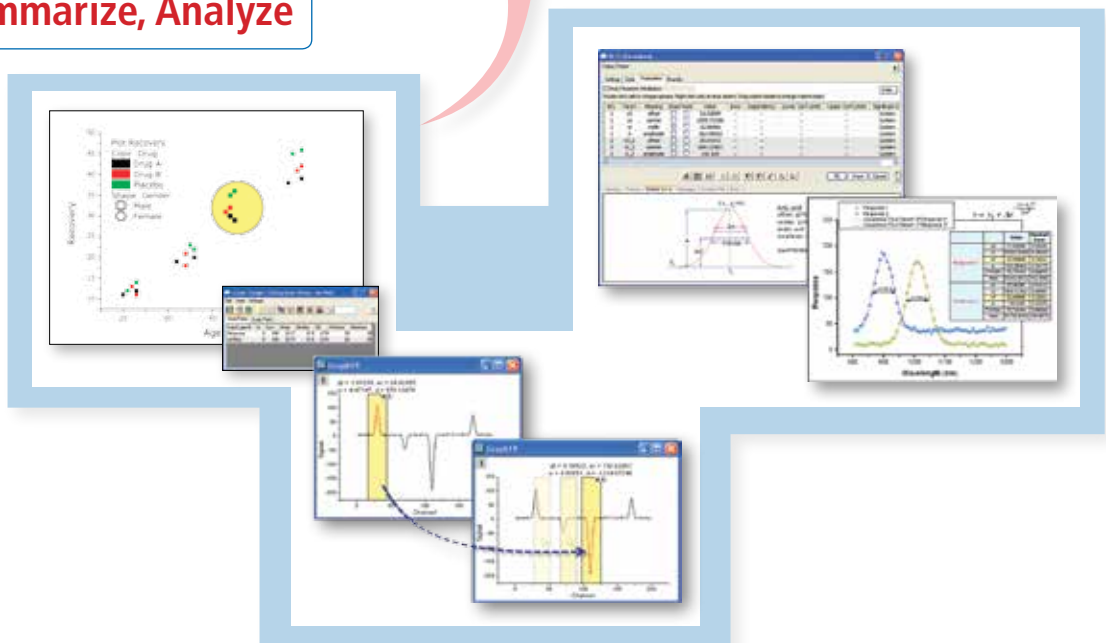
Create publication-quality reports inside Origin, or embed graphs in Word and Power Point.



Recalculate analysis results, and update graphs and reports by simply importing new data.

Reduce, Summarize, Analyze

Reduce, summarize, and analyze data. Use Gadgets to graphically analyze data within a region of interest.

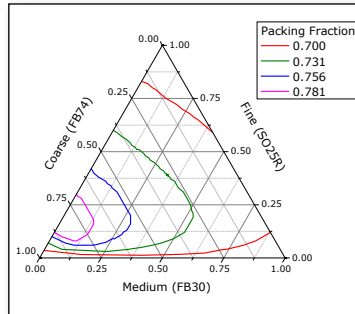


2D Graphing

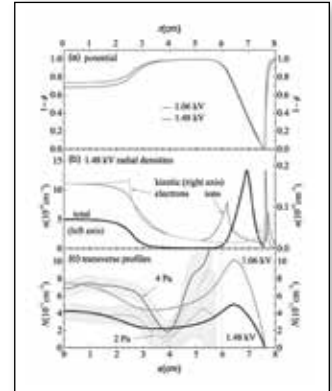
Origin provides many 2D graph templates including line, symbol, column, bar, pie, stock, statistical, contour and area. Specialized plot types include ternary, polar, vector, windrose, and waterfall.

Origin graphs can contain multiple XY axis pairs (layers) that can be arranged arbitrarily, including support for linking axes across layers. Multiple X and/or Y axes with offsets are supported. All graph elements can be easily and extensively customized, including color transparency and gradients.

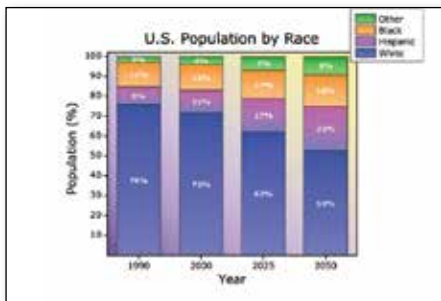
Graph customization can be saved to a template or as a theme for repeated use.



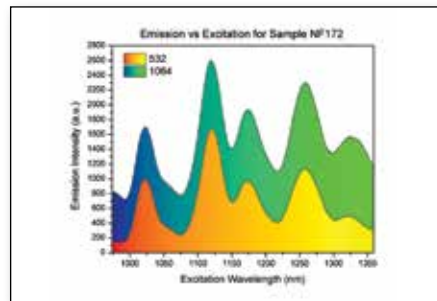
Ternary plot



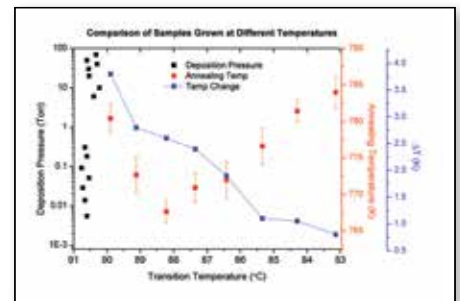
Stacked line plot with linked x-axes



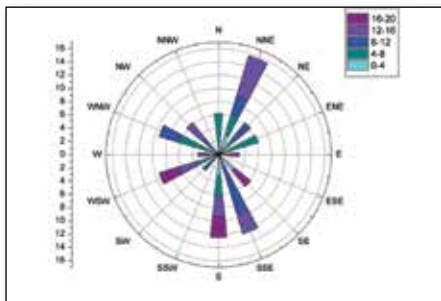
Stacked column plot with gradient color fill



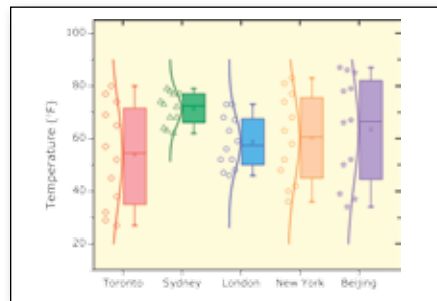
Area plot with gradient color fill



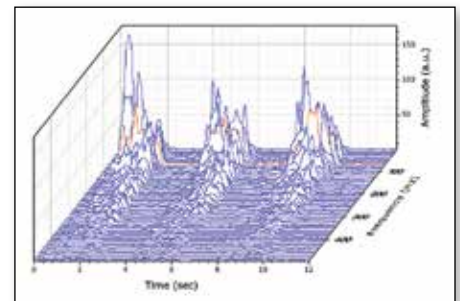
Line and scatter plot with multiple y-axes



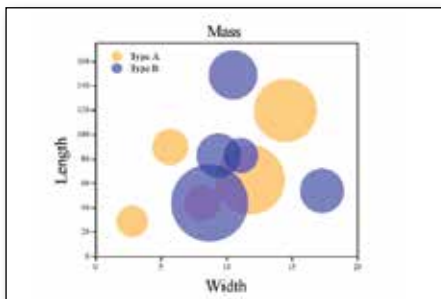
Windrose plot with applied color palette



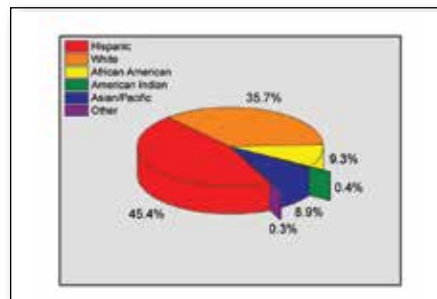
Box chart with data points



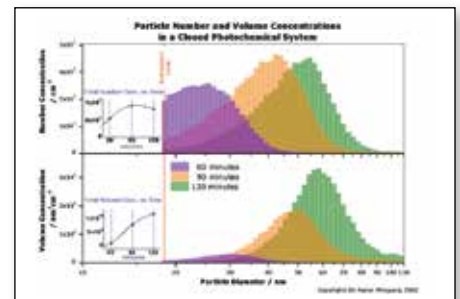
Waterfall plot with highlighted curve



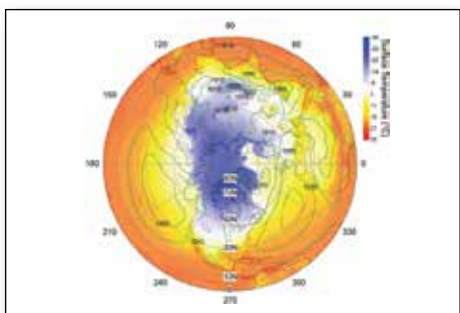
Scatter plot with transparency



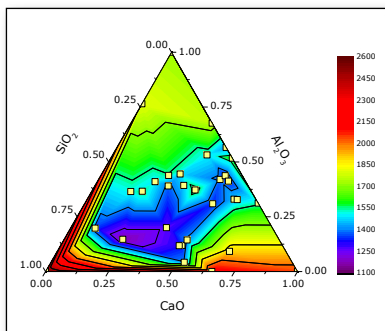
Pie chart with extended wedges



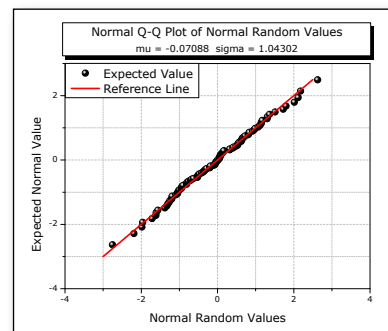
Bar chart with transparency and embedded layers



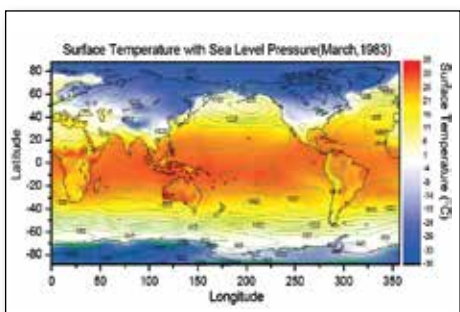
Polar contour with polar plot overlay



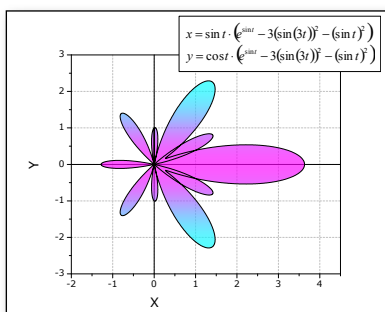
Ternary contour plot with scatter overlay



QQ plot



Overlay of two contour plots



Parametric function plot

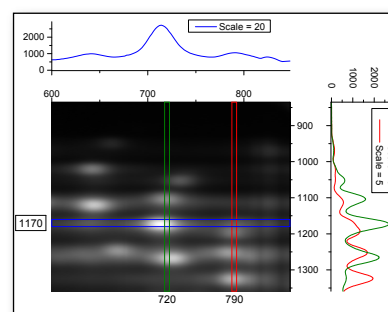
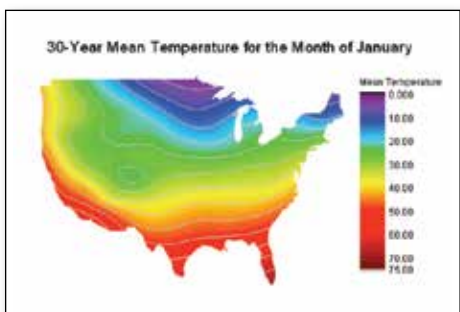
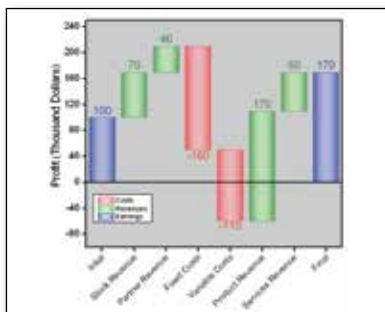


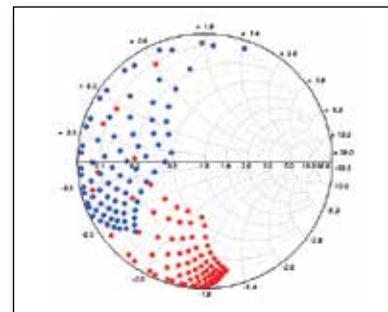
Image profiling



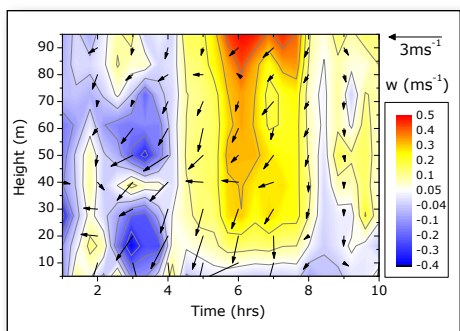
Contour plot with custom boundary



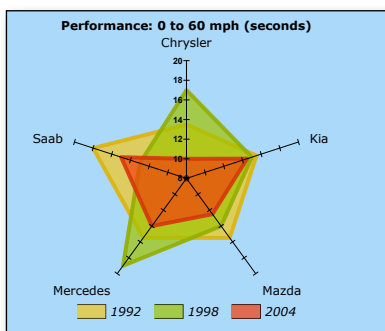
Waterfall chart



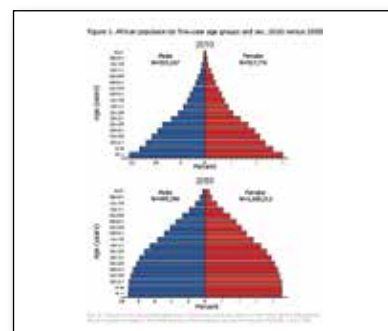
Smith chart



Contour plot with vector overlay



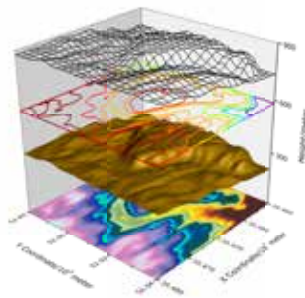
Radar/Spider chart



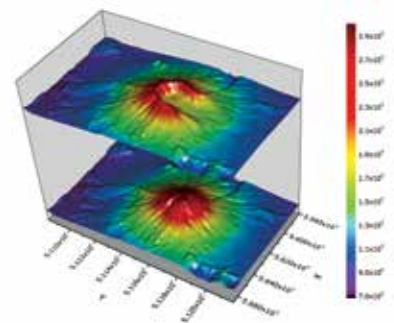
Bar plot

3D Graphing

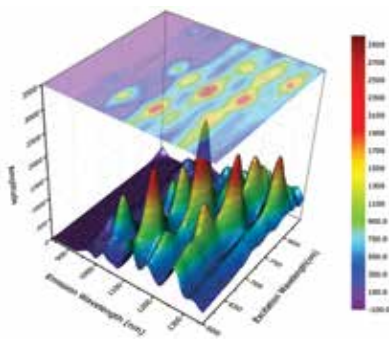
Origin provides high-performance 3D graphs and parametric function plots, created using OpenGL. Many built-in templates such as wireframe, colormap surface with contour projection, scatter, bars, ribbons, and walls are provided. Multiple datasets can be plotted in the same layer, with ability to stack and flatten each dataset individually. Error bars are supported for many of the plot types. Changes can be saved as template or theme for repeat use.



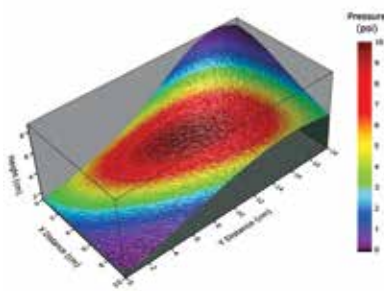
Stacked plot with contour, surface, and wireframe



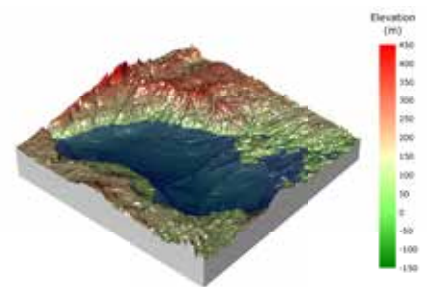
Stacked surface plot



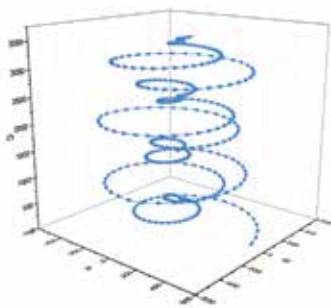
Surface plot with contour projection



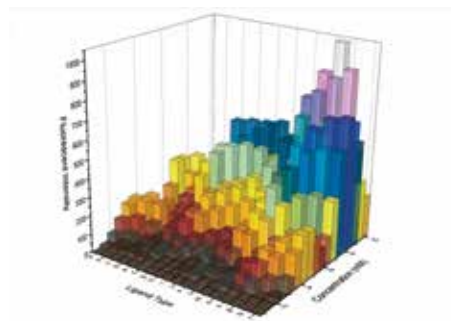
Surface plot with colormap from another dataset



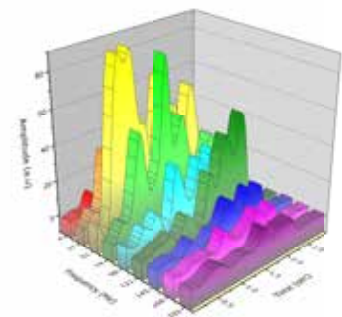
Surface plot with constant plane



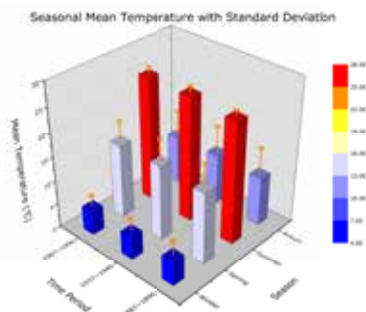
Vector Plot



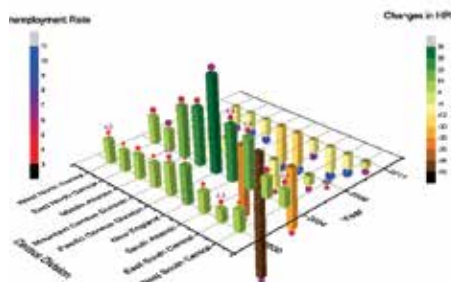
Bar plot with transparency



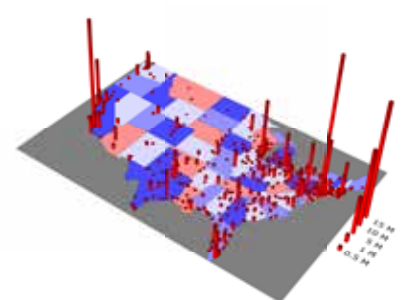
XYZ Wall plot



Bar plot with error bars

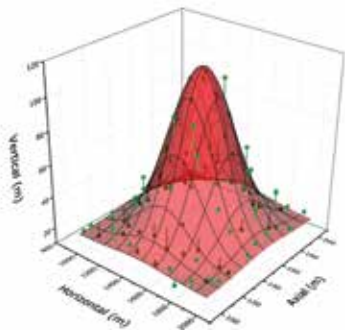


Bar plot with scatter and labels

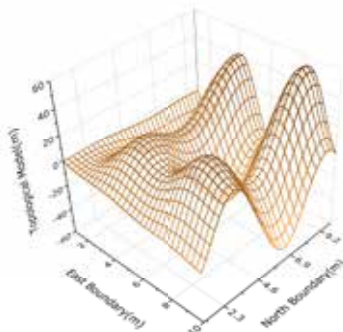


Contour and Bar plot

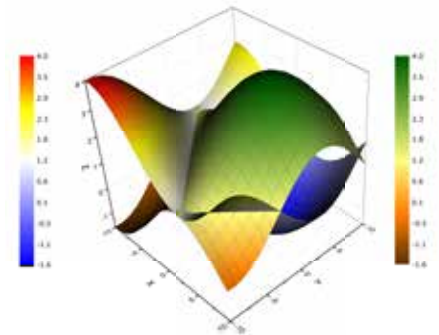
View more 3D graphs at: originlab.com/GraphGallery



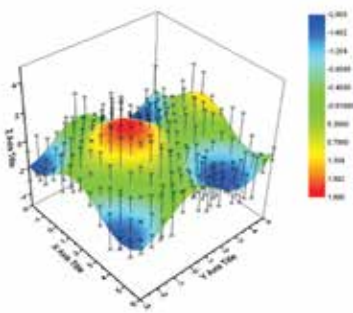
Surface plot with scatter and drop lines to surface



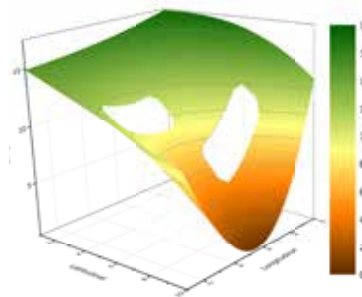
Wireframe plot



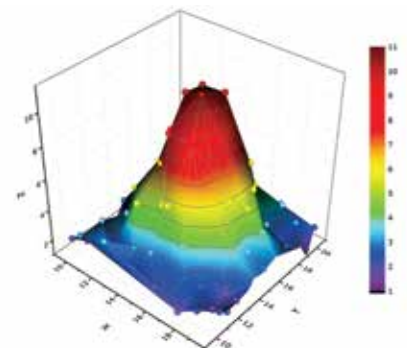
Intersecting surface plots



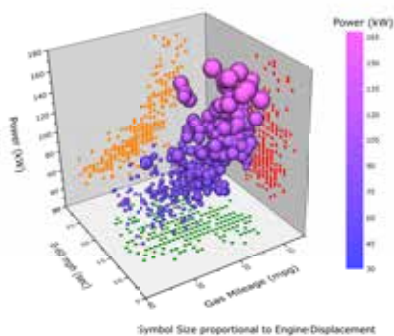
Surface with error bars



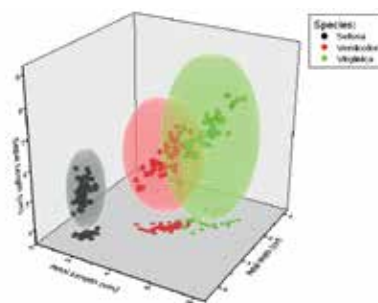
Surface plot with missing values



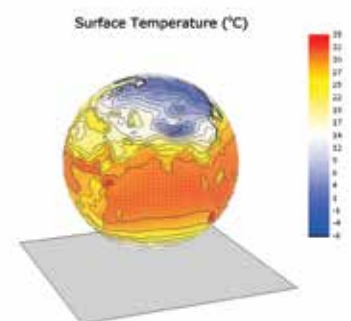
Surface plot from XYZ data



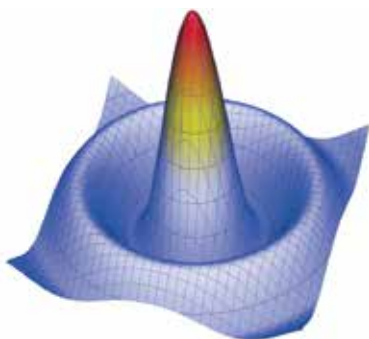
Scatter plot with size and color mapping



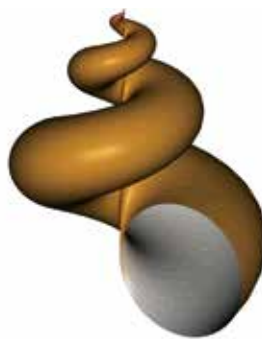
Scatter plot with parametric surfaces



3D Parametric function plot with colormap from another dataset



Mexican hat



Sea shell



Klein bottle

View more 3D Function Plots at: originlab.com/3DFunctions

Database Access

Origin provides easy-to-use tools for database access. Connection and query information can be saved for future use in the workbook or project, allowing for greater ease and efficiency in working with databases.

Origin supports accessing and importing from many databases including:

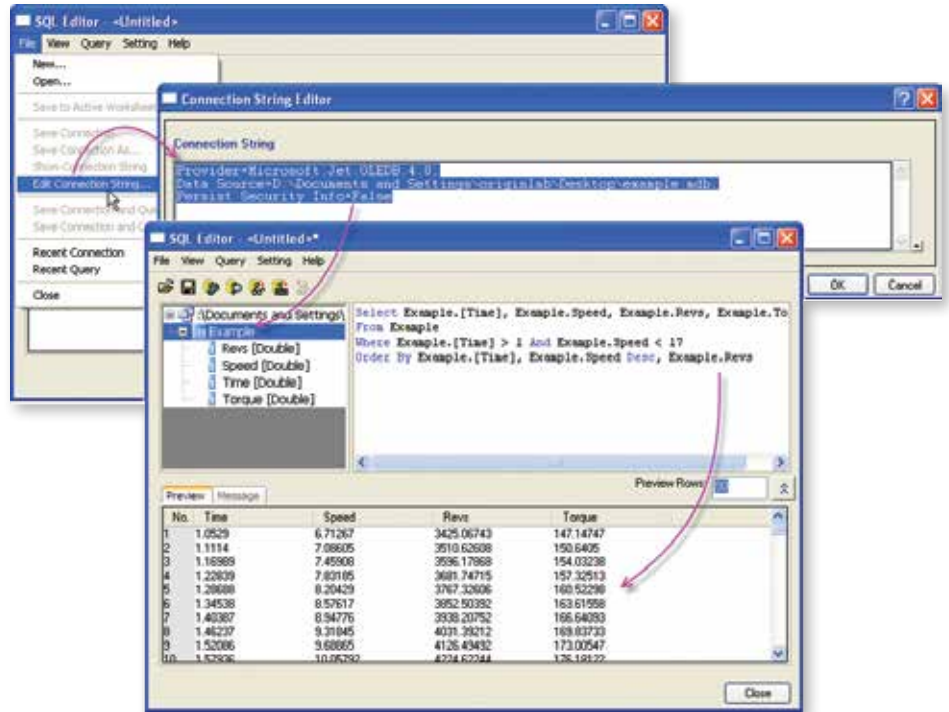
- Microsoft Excel®
- Microsoft Access
- Microsoft SQL Server™
- Oracle®
- MySQL®

SQL Editor

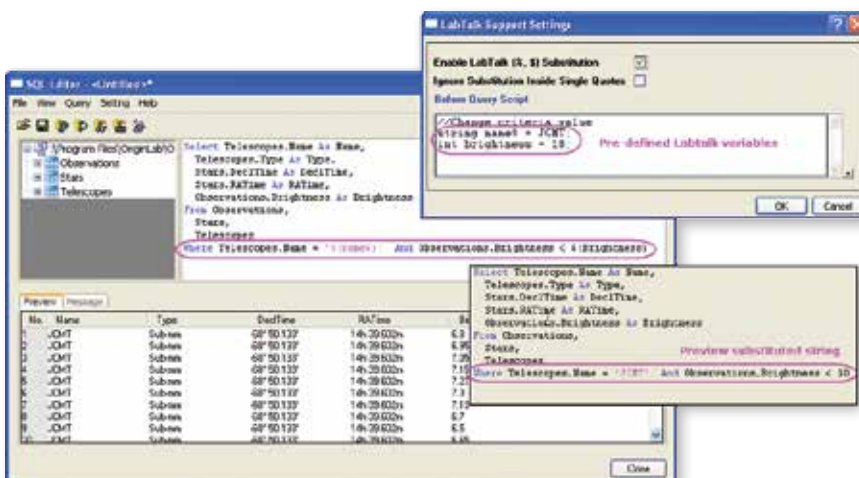
The SQL Editor tool in Origin is intended for users who prefer to work directly within the SQL environment. Quickly connect to a database by editing the connection string and SQL code in the syntax-highlighted editor. The editor is fully integrated with LabTalk, allowing the use of LabTalk commands and variables in an SQL query.

With the SQL Editor, you can:

- Fine tune how your data is brought into Origin
- Use aliases to make the SQL script more intuitive, easier to read, and faster to create
- Perform left or right joins when inter-joining tables
- Create union sub-queries



In SQL Editor, enter connection string and preview query results



Use LabTalk substitution and pre-defined LabTalk variables in SQL query code

Query Builder

The Query Builder tool in Origin is a graphical interface that allows users to visually construct SQL queries, save named queries, and more.

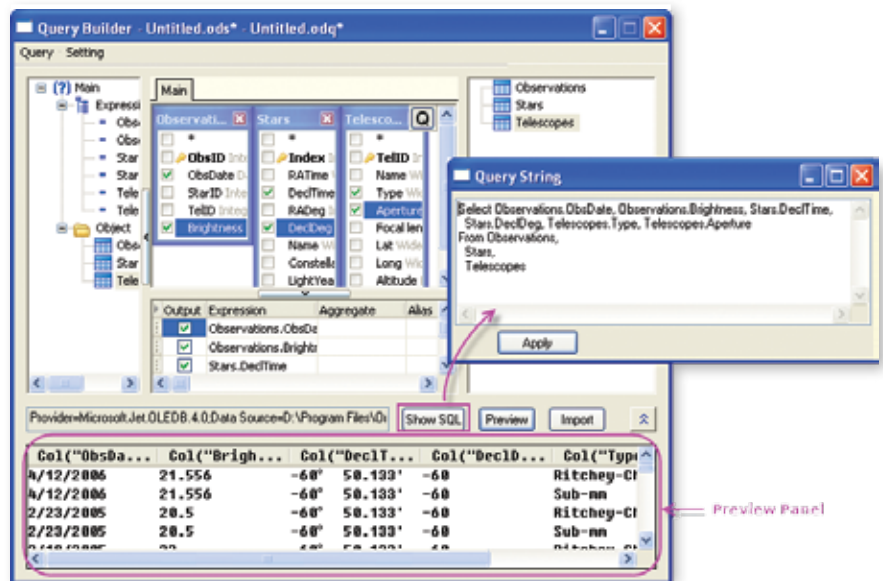
This tool can detect relationships between tables and automatically create appropriate joins. Use Query Builder to define grouping, sorting, unions, sub-queries, and more, for creating complex SQL queries.

Connection and query information can be saved for future use.

With the Query Builder, you can:

- Manually type SQL code or create graphically
- View query tree and available database objects (tables)
- Drag and drop the desired tables from the object viewer to create your query
- Preview your query results before importing
- Save your named query with the worksheet and it then automatically reflects database change
- Re-run your query at any time to see the most current version of your data
- Copy queries from one worksheet to another
- View your query information in the Workbook Organizer
- Use your saved query as part of an Analysis Templates

Note: This tool is currently available only in the 32-bit version of Origin.



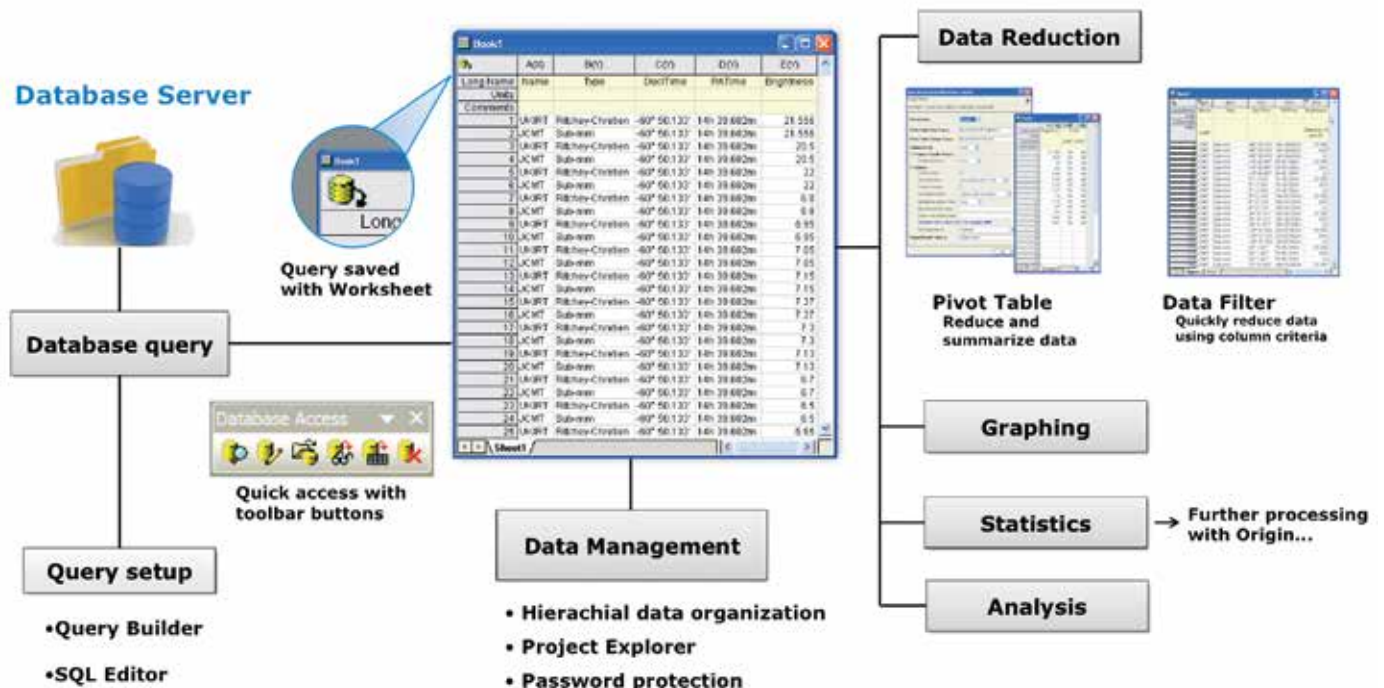
The Query Builder dialog

Post Import Data Processing

As a powerful data analysis and graphing software, Origin provides a wide array of tools to perform post processing of data imported from a database:

- Generate publication-quality 2D or 3D graphs with large datasets, and easily zoom and pan within the graph to visualize your data
- Use data reduction tools such as data filter or pivot table to reduce or summarize large data
- Perform analysis operations on your data such as curve fitting or statistical analysis
- Automatically update graphs and analysis results when you re-import data, or change data reduction or analysis parameters

Database Server

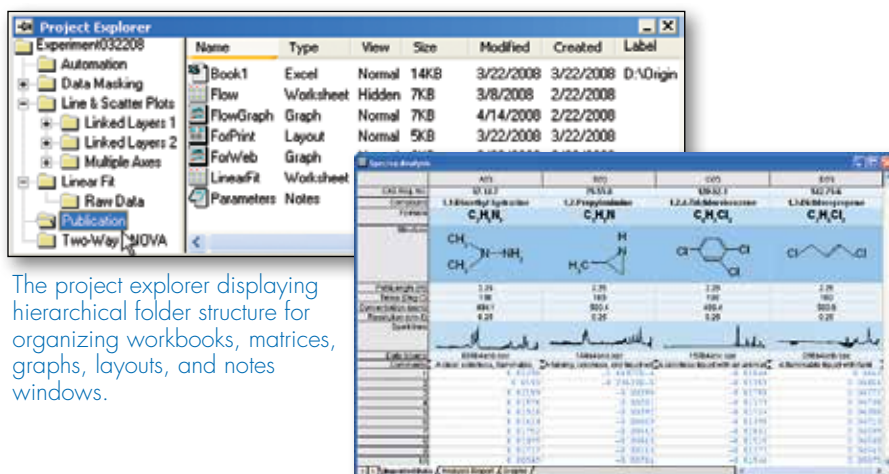


Data Processing

Organizing Your Data

Origin provides an easy, flexible, and hierarchical approach to organize your data:

- The Origin Project file (.OPJ) combines data, notes, graphs, and analysis results in one document with flexible hierarchy for folder structure
- The Project Explorer window allows easy navigation within the project
- Workbooks and Matrices support multiple sheets, and columns/objects, and an organizer panel for additional metadata



The project explorer displaying hierarchical folder structure for organizing workbooks, matrices, graphs, layouts, and notes windows.

Workbook with multiple sheets, data columns, metadata label rows, and sparklines.

Data Exploration

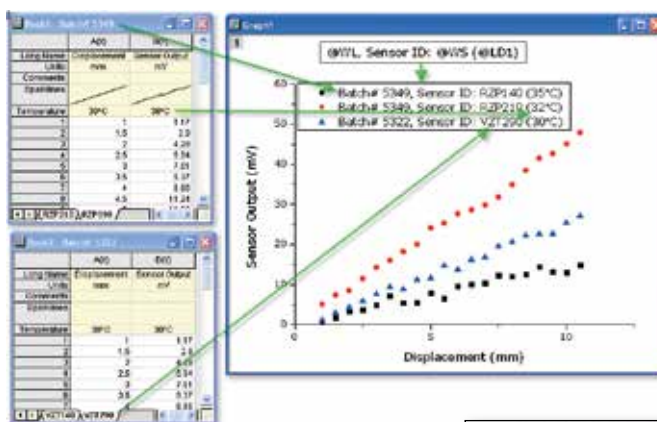
Origin provides easy to use tools to examine and interact with your graphical data:

Zoom and Pan

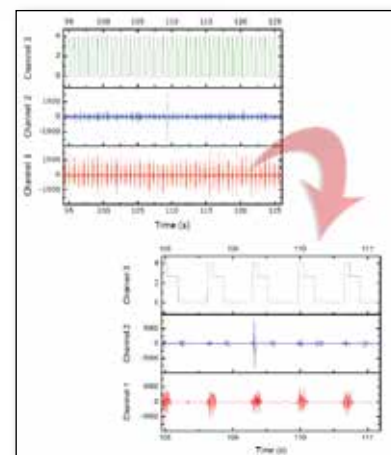
- Magnify a region of the graph
- Easily zoom and pan to desired X/Y scale
- Plot zoomed region as a separate graph

Examine Data Points and Related Data

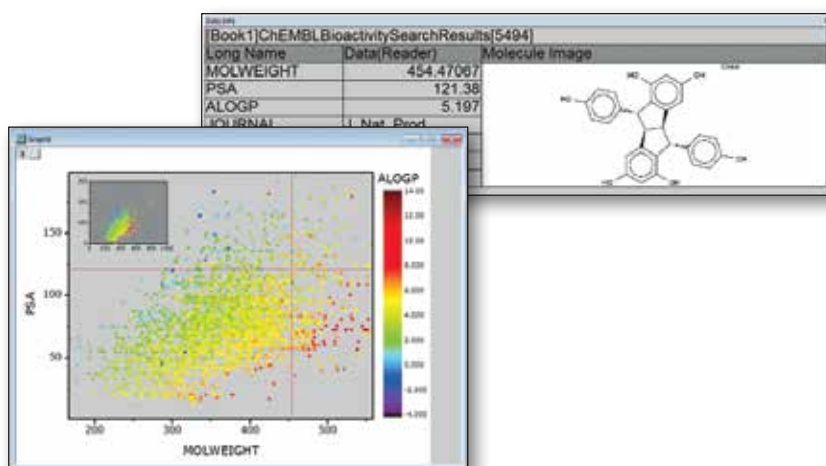
- Use Data Reader and Screen Reader tools to examine your data
- Use Data Info tools to read or label data points, displaying the related information from other columns in the data worksheet
- Use masking tools to allow you to exclude data points from analysis
- Use the Vertical Cursor Gadget for exploring data in stacked graphs



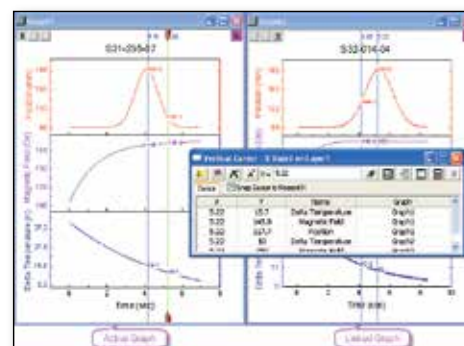
Use metadata from multiple locations in your workbook to annotate your graphs



Zoom and pan to the desired X/Y scale



The Data Info tool lets you explore data from your graph, including display of related information from other columns



Use vertical cursor for multiple graph windows simultaneously

Gadgets

When your data is plotted in a graph, Origin gadgets provide a quick and easy way to perform exploratory analysis on the graph. Perform the analysis on a specific range of the data plot by appropriately positioning a region-of-interest (ROI) object to select the desired range. The ROI object provides a fly-out menu with various options that are tailored to each specific gadget. All gadgets have a fly-out menu with a Preferences option allowing you to customize desired settings.

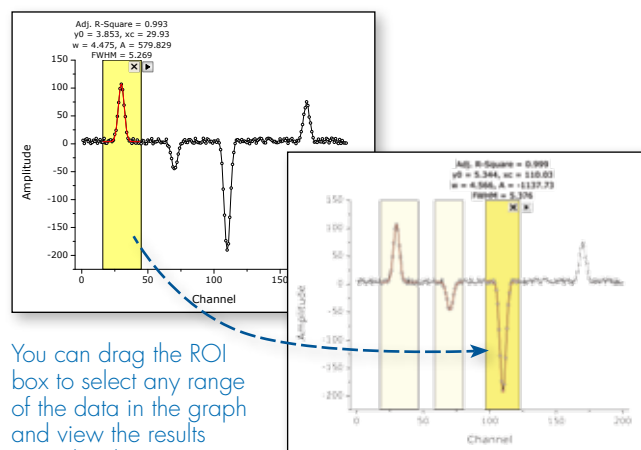
With Origin gadgets you can:

- Select the desired data range for analysis directly from the graph
- Get immediate visual output of results
- View updated results on screen when the ROI is moved or resized
- Customize the output, including appending results to a worksheet for each ROI position
- Save settings as a Theme for repeat use

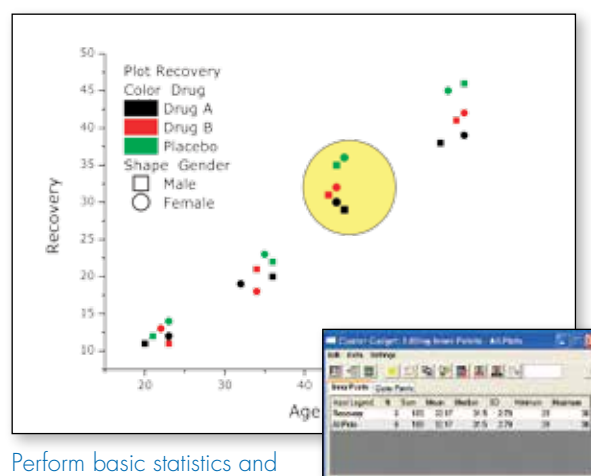
A selection of the gadgets available in Origin and OriginPro are described below. Please see other sections for additional gadgets.

Cluster **PRO**

The Cluster Gadget makes it convenient to perform simple statistics on a region of interest (ROI) in a graph. The gadget also allows you to easily edit the data points, such as to clear or mask points. The statistics results are dynamically updated as the ROI object is moved or resized.



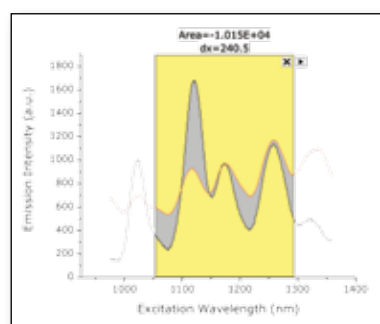
You can drag the ROI box to select any range of the data in the graph and view the results immediately.



Perform basic statistics and editing of data points within a region

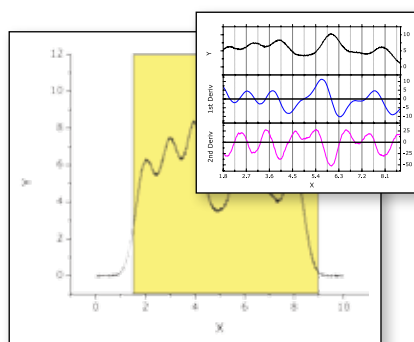
Integrate, Differentiate, and Interpolate

Origin provides three gadgets for the common tasks of integration, differentiation, and interpolation of your data.



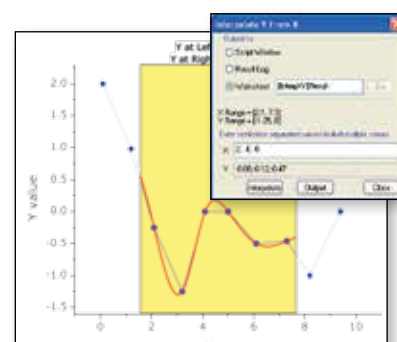
Integrate Gadget

Simplifies peak area calculations.



Differentiate Gadget

Lets you specify the desired derivative order and view the result in a separate graph.



Interpolate Gadget

Allows easy up-or-down sampling of existing data and finding desired X/Y values.

“When working with many data points, graphing is often the quickest way to qualify data and identify trends. With the Origin statistics gadget, it’s also easy to pull quantitative information, such as mean and standard deviation, straight from a data plot. This lets me make better decisions about which data to select for more detailed analysis.”

Boaz Vilozny, Postdoctoral Researcher, University of California at Santa Cruz

"The new Quick Fit Gadget is fantastic and I absolutely love that I can output results to a worksheet so that I can get a column of a particular parameter on which I can do statistical analysis."

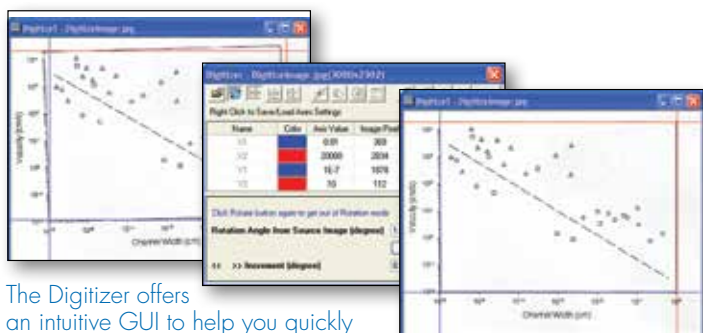
Greg Scott, University of Illinois at Urbana-Champaign

Digitizer

The Digitizer Gadget can extract data from images of graphs such as photocopied, faxed, or scanned images. Easily define coordinate values for the axes, and digitize multiple data curves to create an Origin worksheet and graph.

With this gadget you can:

- Digitize an image using an intuitive GUI
- Rotate image
- Define X, Y axes coordinates using movable line
- Use vertical and horizontal reference lines to check accuracy of axes coordinates
- Digitize multiple traces creating multiple data sets
- Add labels for data points

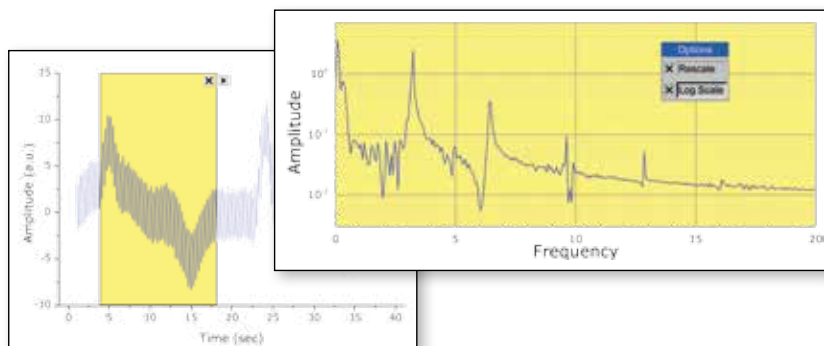


The Digitizer offers an intuitive GUI to help you quickly and easily get the values of the data points from the image. Useful features include axes reference lines, image rotation, and ability to edit digitized points

FFT

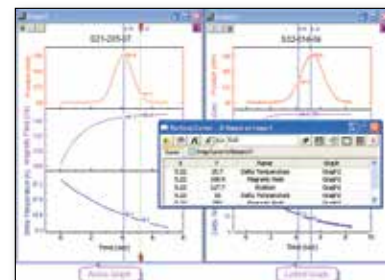
The FFT Gadget provides a simple and quick way to examine the frequency spectrum of data plotted in a graph. The frequency spectrum is displayed in a separate preview graph window, and is dynamically updated as the ROI object is moved or resized.

The Amplitude axis scale of the FFT result graph can be switched between linear and log scales.



Vertical Cursor

The Vertical Cursor Gadget provides an easy way to read X and Y coordinate values for data points on stacked panel plots and/or multiple linked graphs.



With this gadget you can: Use vertical cursor for multiple graph windows simultaneously

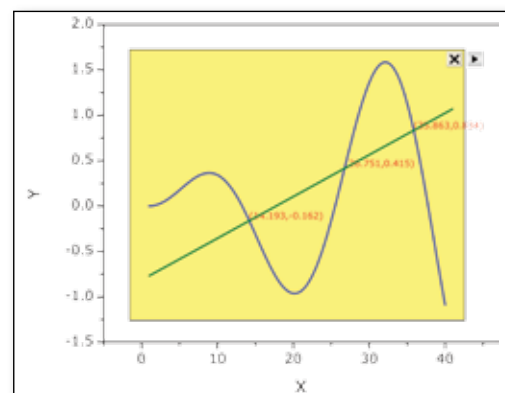
- Link multiple graphs to read coordinates simultaneously
- Drag by the handle, or enter an X value in the dialog, to place on the reference layer
- Tag crossing points on a graph and output the XY values to a worksheet
- Add multiple tags on a graph, labeling each with a unique name
- Select the plots for which to show labels
- Snap to the nearest data point in the X direction

Intersection

The Intersection Gadget gives you an interactive way to calculate the intersection points of the input curves in the ROI.

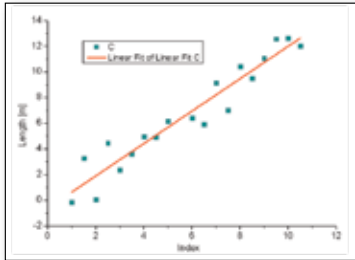
With the intersection gadget you can:

- Find intersection points for more than two curves
- Tag intersection points with symbols and XY values
- Output the XY values of intersection points to a worksheet
- Change input to show intersection points on different curves
- Interpolate the input curves with a specified number of sampling

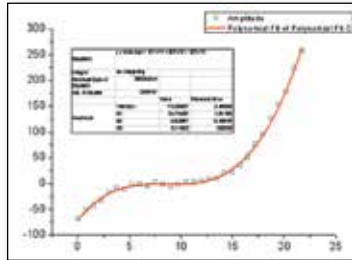


Curve Fitting

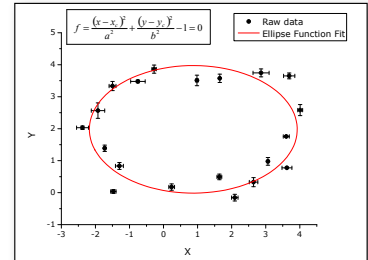
Origin provides various tools for linear, polynomial and nonlinear curve fitting. Fitting routines use state of the art algorithms and the report sheets including statistical quantities to determine goodness of fit. Create custom fitting reports and save your customization as an Analysis Template for repeat fitting including Batch Fitting of multiple datasets.



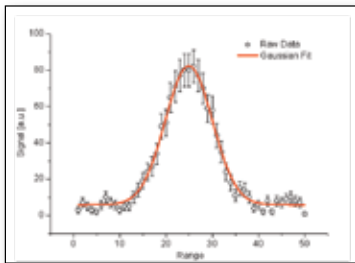
Linear



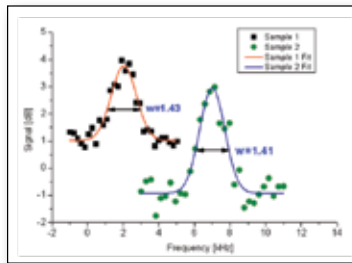
Polynomial



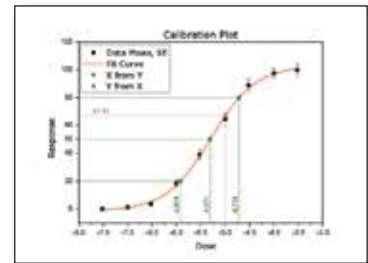
Implicit



Weighted



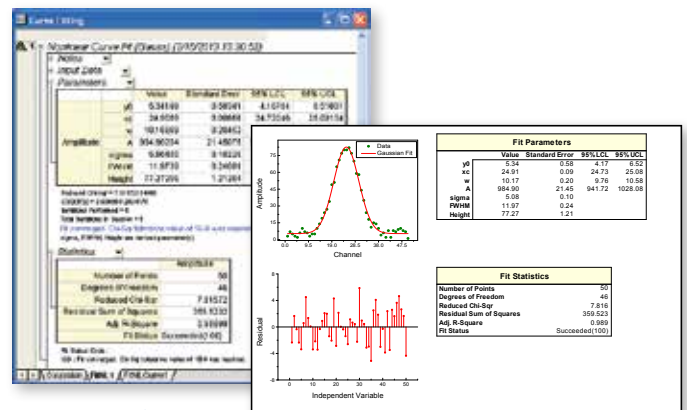
Global



Concatenate/Replicate

Origin provides full control of the fitting process...

- Flexible data input
- Fit with various built-in functions, including both explicit and implicit
- A wizard for defining custom fitting functions
- Multi-dataset fitting modes: fit multiple datasets independently, in concatenate fit mode, or use a global fit with shared parameters
- Fit statistics and parameters output to the fit report
- Residuals analysis
- Interpolation on the fit curve to compute new X/Y values at desired locations
- Recalculation of your fitting results automatically when data or parameters are changed
- Analysis Templates to save your settings and desired results for repeat use or batch processing

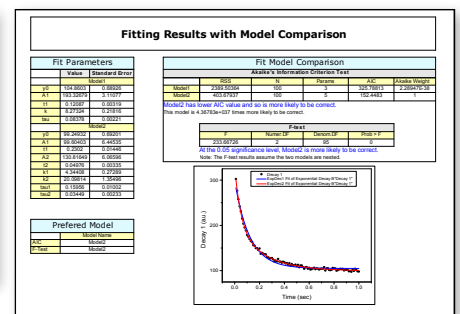
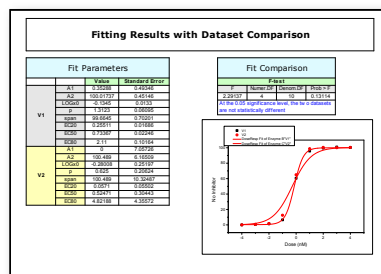


Use Origin's fit report sheets, or easily create custom reports by combining graphs and numerical results from the fitting process

Fit Comparison PRO

OriginPro provides the following tools for fit comparison:

- Compare two fitting models with dataset
 - F-test
 - Akaike's Information Criterion (AIC) test
- Compare one fitting model with two datasets
 - F-Test

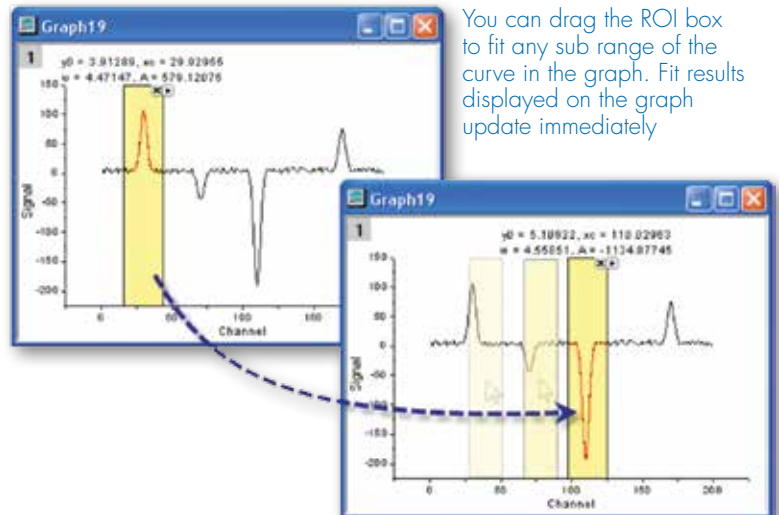


"Not only does Origin handle the most demanding curve fitting tasks with ease, it also has a built in C compiler that allows me to customize complex functions - a feature that has been crucial to my research. Origin is an indispensable tool to my grad students, whose PhD work hinges on being able to code our functions in C. To top it off, Originlab has a knowledgeable and responsive technical support staff, second to none. I wholeheartedly recommend Origin."

Mark Kuzyk, Ph.D., Regents Professor of Physics and Astronomy, Washington State University

Quick Fit Gadget

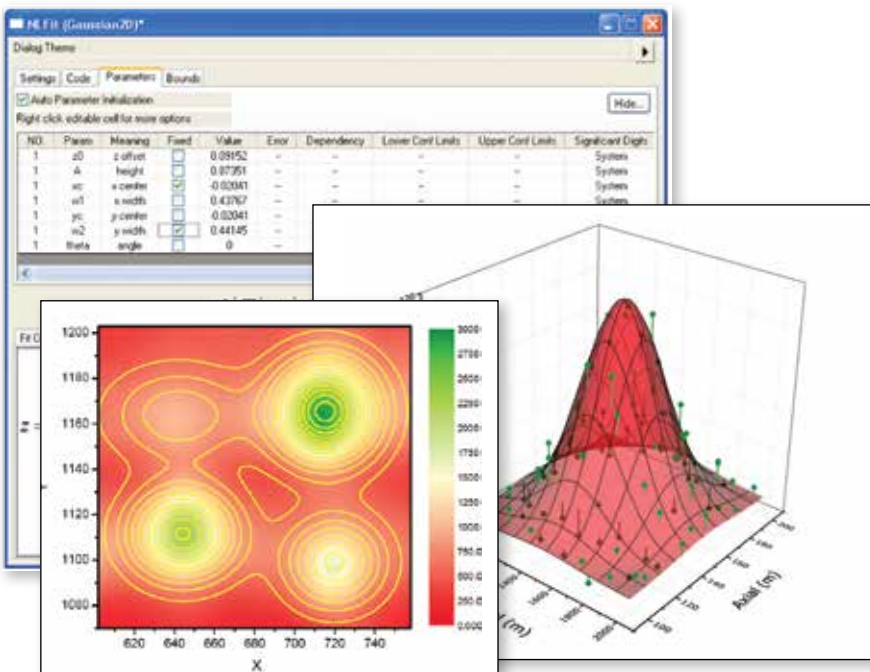
Origin provides a simple tool to quickly fit data plotted in a graph. Move or resize a region of interest (ROI) object to update results. Interactively perform fit operations on multiple ranges of the same dataset, or on multiple datasets in the graph.



You can drag the ROI box to fit any sub range of the curve in the graph. Fit results displayed on the graph update immediately

Fit parameters and other key values can be output directly to the graph or to a worksheet

Long Name	Function	Input	Range	Weighting	E(Y)	F(Y/Err)	O(Y)	H(Y/Err)	I(Y)	J(Y/Err)
Units					y0	y0-Error	xc	xc-Error	w	w-Error
Comments										
1	Gauss	Signal	[154:181]	No Weighting	4.56663	0.60785	170.00289	0.0641	4.64227	0.14407
2	Gauss	Signal	[141:168]	No Weighting	5.4106	0.58756	169.1392	1.31362	3.82151	1.20206
3	Gauss	Signal	[96:123]	No Weighting	5.40797	0.56776	110.02963	0.01625	4.56804	0.0409
4	Gauss	Signal	[61:88]	No Weighting	4.32127	0.60784	70.15248	0.07754	4.61447	0.17405
5	Gauss	Signal	[16:43]	No Weighting	3.91289	0.71431	29.92955	0.04407	4.47147	0.09838
6	Gauss	Signal	[157:184]	No Weighting	4.49203	0.65383	170.00288	0.06091	4.6491	0.13893
7										



Contour plot displaying raw data and fit results from a 4-peak surface fit

3D Surface Fitting PRO

Origin performs 3D surface fitting on XYZ worksheet data and matrix data using one of 19 built-in models or your own custom formula.

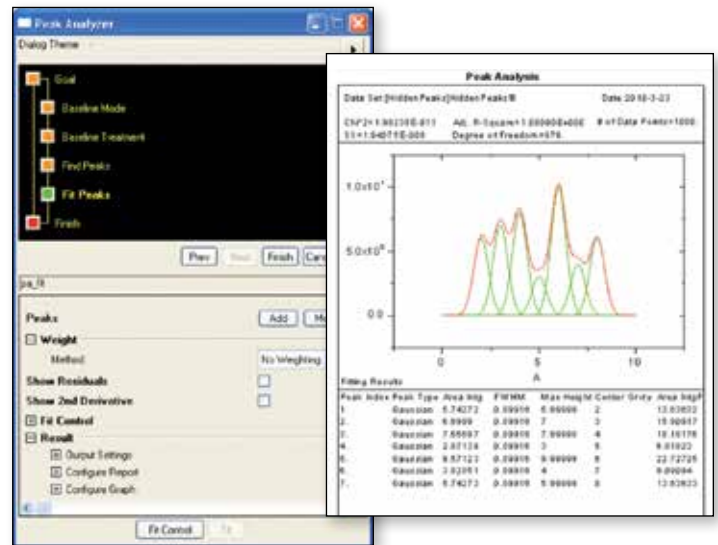
Data points and fit surface are shown together. The fit surface has been made transparent to show more of the data. Drop lines from the data points to the surface have been added

Peak Analysis

Origin's Peak Analyzer is a powerful and versatile tool for peak and baseline detection and analysis.

- A wizard guides you through the fitting process
- Find and treat the baseline, find and select peaks, integrate peaks
- Generate a detailed report sheet with tables and relevant graphs
- Generate a worksheet with peak properties, including FWHM, centroid, area, peak index, and y-max

The additional features of peak fitting and baseline fitting described below are only available in OriginPro.

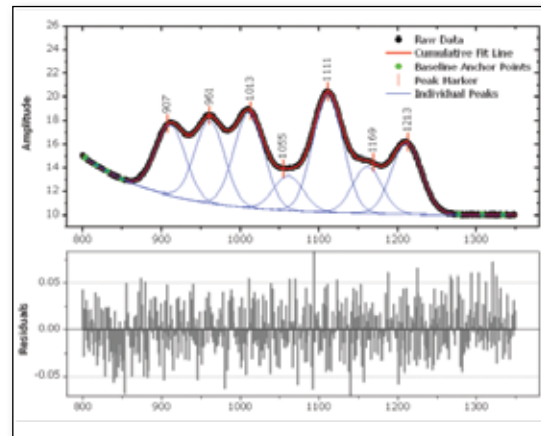


Multi-peak fitting with a detailed report

Peak Fit Control PRO

When using the Peak Analyzer to fit peaks, many options are available to customize your analysis.

- Add, delete or adjust the position of peaks directly on the graph
- Assign the same fitting function to all peaks, or use different fitting functions for each peak, or group of peaks
- Fix peak parameters to a constant value
- Share parameters across peaks
- Apply bounds and linear constraints to fitting parameters
- Plot residuals and second derivative of the fit curve
- Use over 20 built-in peak functions—including Gauss, Voigt, and Lorentz—or create your own



Control the fitting process directly on the graph

ID	Peak Type	Param	Meaning	Share	Fixed	Value	Error	Dependency	Significant Digits	Lower Bound
0	Constant	y0	unknown	0	<input checked="" type="checkbox"/>	0.7	0	0	System	--
1	Lorentz	xc_1	center	0	<input type="checkbox"/>	1.00016	0.0362	8.4325E-4	System	
1	Lorentz	w_1	FWHM	1	<input type="checkbox"/>	0.42666	0.11958	0.63425	System	0
1	Lorentz	A_1	area	2	<input type="checkbox"/>	82.85819	19.63085	0.74389	System	
2	Gaussian	xc_2	center	0	<input checked="" type="checkbox"/>	4	0	0	System	
2	Gaussian	A_2	amplitude	0	<input type="checkbox"/>	119.84023	11.9369	0.41196	System	
2	Gaussian	w_2	FWHM	0	<input type="checkbox"/>	0.75756	0.0836	0.36139	System	0
3	Gaussian	xc_3	center	0	<input type="checkbox"/>	5.98962	333535.65745	0.52358	System	
3	Gaussian	A_3	amplitude	1	<input type="checkbox"/>	0.42666	0.11958	0.63425	System	0
3	Gaussian	w_3	FWHM	2	<input type="checkbox"/>	82.85819	19.63085	0.74389	System	

With the Peak Fit Parameters dialog, you have full control of the fitting parameters.

Share a common parameter between peaks, fix the value of any parameter, or apply bounds. Right-click on a parameter value to share it with other peaks in the fitting operation

“When the signal is small compared to the baseline noise, baseline subtraction is tough. In Origin, it was incredibly easy to create a test baseline (picking anchor point manually by clicking on the graph). Once we found the best baseline, we could process multiple data sets automatically. You just can’t do this with any other software.”

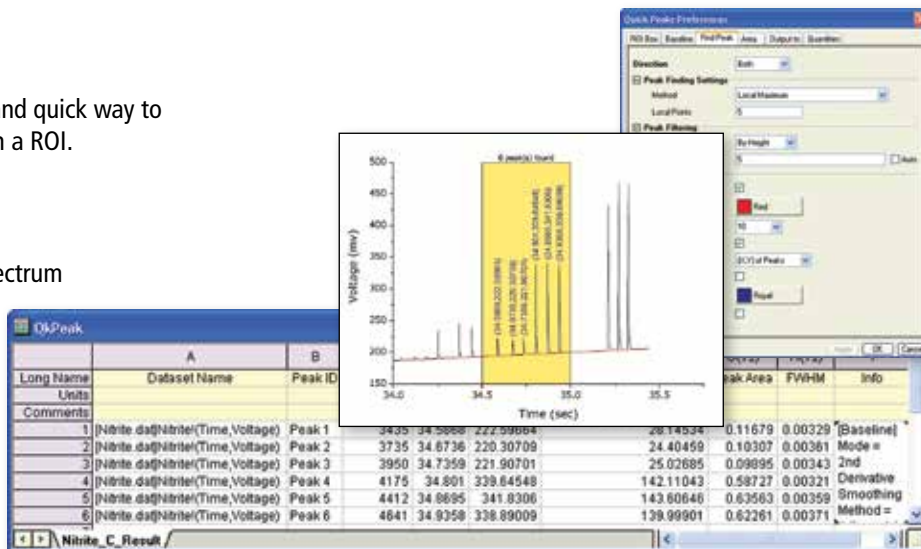
Rosina Georgiadis, Associate Professor, Chemistry Department, Boston University

Quick Peaks Gadget

The Quick Peaks Gadget provides a simple and quick way to perform peak analysis of plotted data within a ROI.

With this gadget, you can:

- Locate positive and negative peaks
- Define baseline and subtract from the spectrum
- Integrate peaks within base markers
- Perform peak fitting with frequently used functions
- Create a report sheet with parameters from each peak

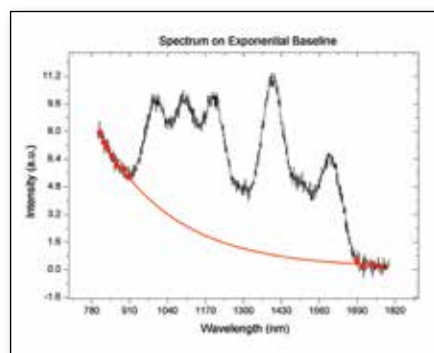


Create baseline, find Peaks, integrate peaks and output results

Fitting a Baseline PRO

OriginPro not only fits peaks, but can fit a function to your baseline data as well. The following options allow flexibility in fitting your baseline:

- Select baseline anchor points, or have Origin automatically find them.
- Fit baseline anchor points using a pre-defined fitting function, or create your own.
- Fix the baseline anchor points, or allow them to vary with the peak fit.
- Subtract the baseline prior to fitting peaks.

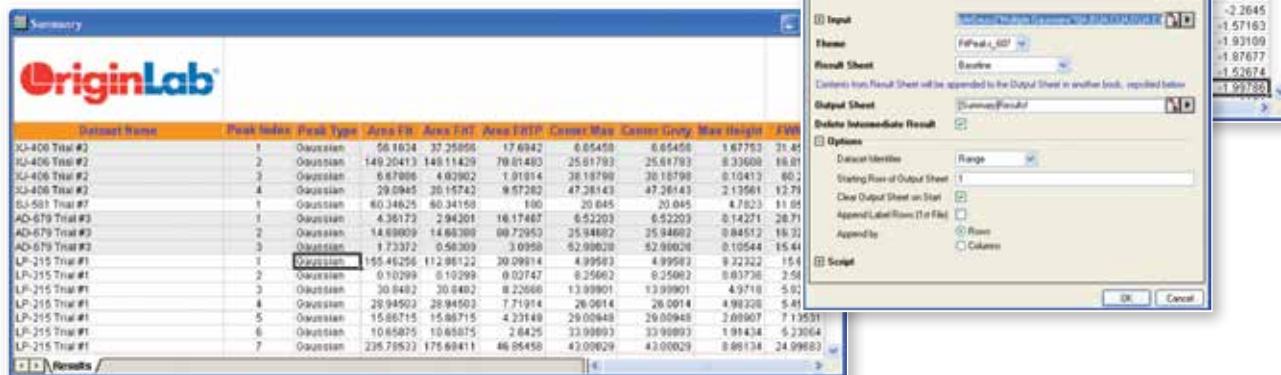


Fit a baseline to an exponential function using anchor points

Batch Peak Fitting PRO

With batch peak fitting, OriginPro can handle many datasets, each containing multiple peaks.

- Perform batch peak fitting using a pre-defined theme, an analysis template, or script.
- Output a custom report of peak parameters for each peak in each dataset.



Perform peak fitting on multiple datasets using a pre-defined theme; output the results to a customized worksheet

Signal Processing

Signal Transforms

Origin provides several transform methods used for analyzing digital signals.

- Fast Fourier Transform and Inverse Fast Fourier Transform (FFT/IFFT)
- Short-time Fourier transform (STFT) **PRO**
- Hilbert Transform **PRO**
- 2D FFT/2D IFFT **PRO**
- Image Profiling: Simple Line Profiling: Horizontal, Vertical, Straight Line

Filtering

- FFT Filter:
 - Low Pass, High Pass, Band Pass, Band Block, Noise Threshold
- IIR Filter Design **PRO**
 - Butterworth, Chebyshev Type I, Chebyshev Type II, Elliptic
- 2D FFT Filter **PRO**

Smoothing

Origin offers multiple methods to smooth data

- Savitzky-Golay
- Adjacent-Averaging
- FFT Filter
- Percentile Filter

Correlation

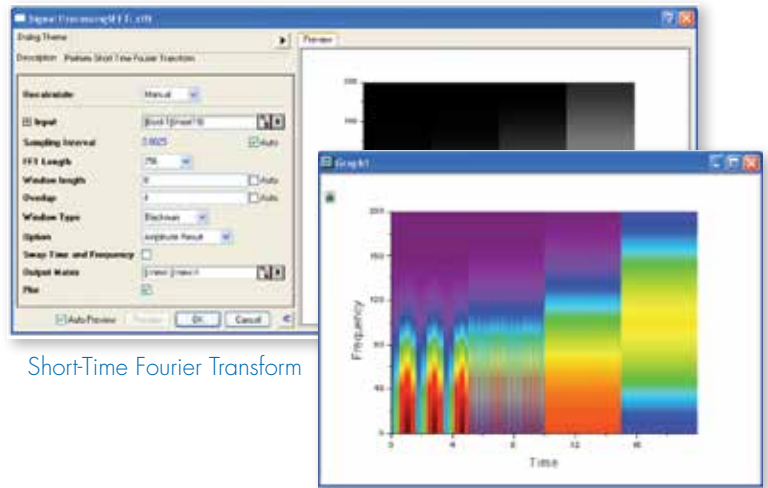
Origin supports 1D and 2D correlation to detect the correlation between a pair of signals

- Correlation
- 2D Correlation **PRO**

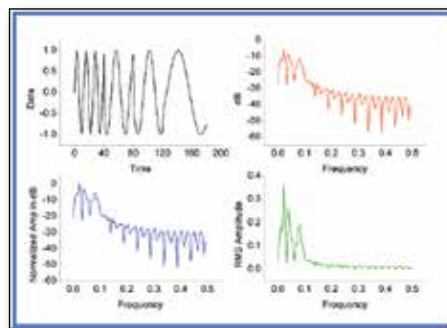
Convolution/Deconvolution

Two types of Convolution and deconvolution are supported

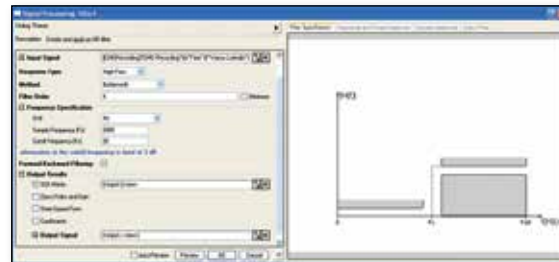
- Linear
- Circular



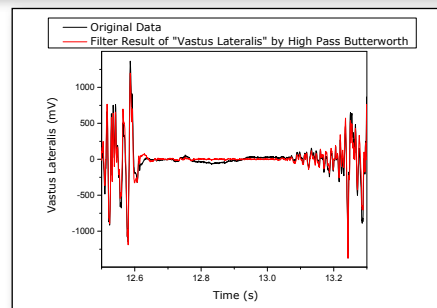
Short-Time Fourier Transform



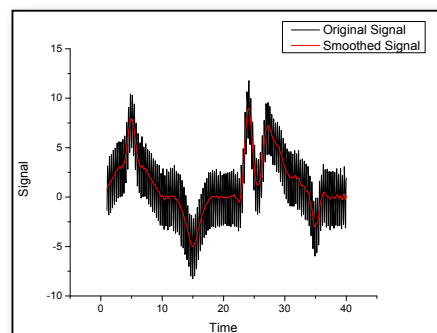
Results of FFT, including original signal and results in frequency domain



IIR Filter Design Dialog and Result



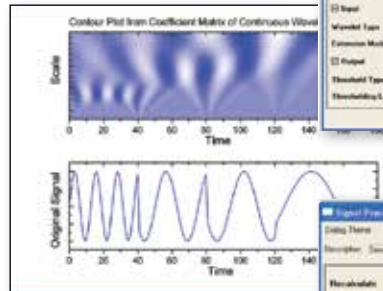
Smoothing



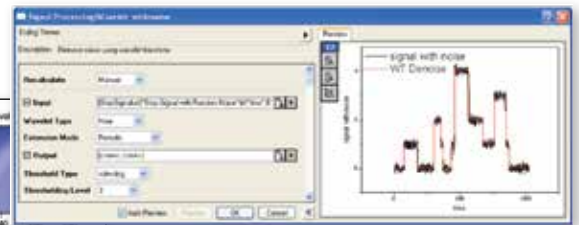
Wavelet Analysis **PRO**

Wavelet Transforms are used in many applications, including data compression, signal smoothing, noise removal, and image analysis. Wavelet analysis tools include:

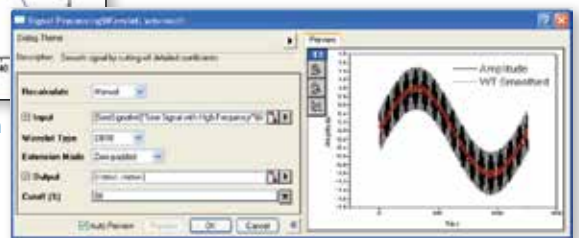
- Continuous Wavelet Transform
- Discrete Wavelet Transform
 - (Decomposition)
- Inverse Discrete Wavelet Transform
 - (Reconstruction)
- Multi-Scale Wavelet Decomposition
- Smoothing
- Noise Removal
- 2D Wavelet Decomposition
- 2D Wavelet Reconstruction



Continuous Wavelet Transform



Remove Noise Using Wavelet Transform

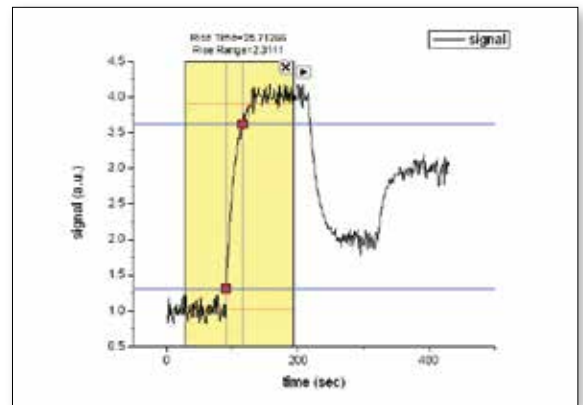


Wavelet Smoothing

Rise Time Gadget **PRO**

Three methods of finding the rise/fall time are supported:

- Linear search
- Histogram
- Largest triangle
- Select a specific region of the signal by moving and resizing a region of interest (ROI)
- Easily select desired data plot from the graph layer with multiple plots
- Display low and high levels inside the ROI control
- Display rise/fall time and rise/fall range on top of ROI



Rise Time Gadget

Decimation **PRO**

Decimation is used to reduce the number of elements in an input sequence. Every N samples are merged into one. Two filters are available:

- Moving Average
- Finite Impulse Response (FIR)

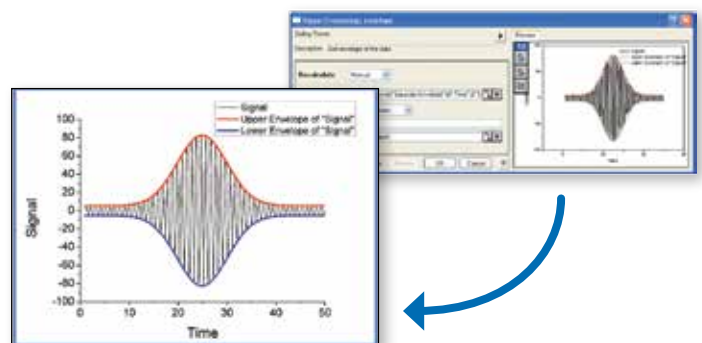
Coherence **PRO**

Coherence—the degree of linear dependency of two signals—is evaluated by testing whether the signals contain similar frequency components.

Envelope Curves **PRO**

An envelope curve traces the crests and troughs of a periodic signal.

- Choose upper, lower or both
- Smoothing option during envelope detection



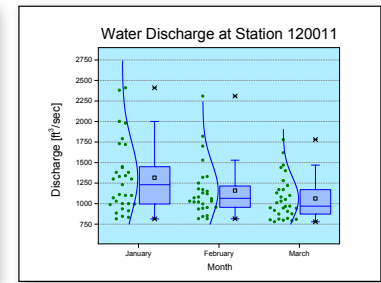
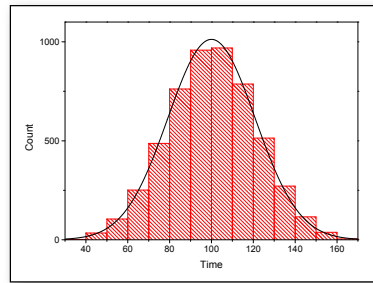
Envelope Curves

Statistics

Statistical Graphs

Origin provides several types of statistical graphs:

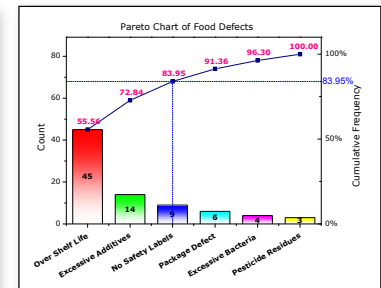
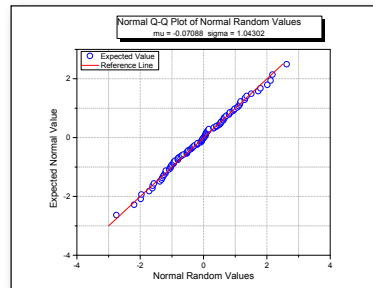
- Box Chart
- Histogram
- Scatter Matrix
- Probability Plots & Q-Q Plots
- Pareto Charts & QC (X bar R) Charts



Descriptive Statistics

Origin provides tools to help you summarize your continuous and discrete data:

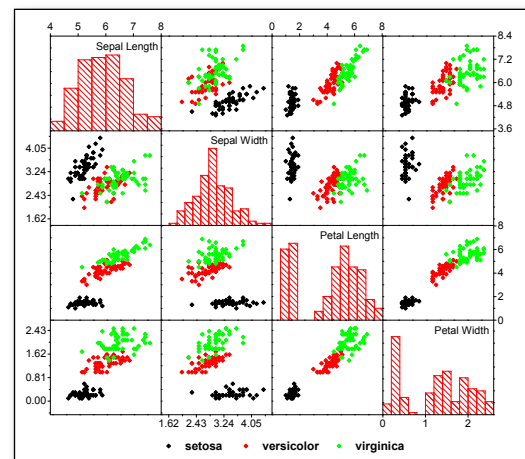
- Statistics on Columns
- Statistics on Rows
- Frequency Counts
- 2D Frequency Count/Binning
- Normality Test
- Discrete Frequency **PRO**
- Correlation Coefficient **PRO**



Parametric Hypothesis Tests

Five hypothesis tests for mean and variance are available:

- One-Sample t-Test
- Two-Sample t-Test
- Pair-Sample t-Test
- One-Sample Test for Variance **PRO**
- Two-Sample Test for Variance **PRO**



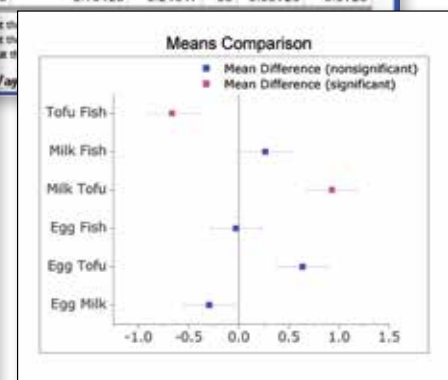
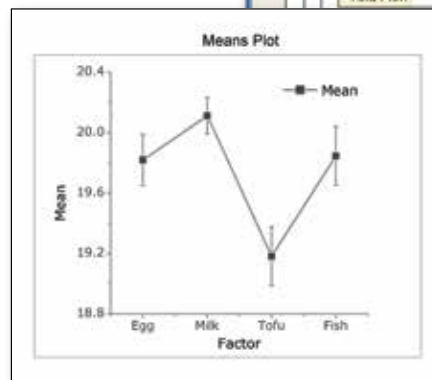
ANOVA

Origin provides four ANOVA tools to examine the variance of a dependent variable:

- One-Way ANOVA
- Two-Way ANOVA
- One-Way Repeated-Measures ANOVA **PRO**
- Two-Way Repeated-Measures ANOVA **PRO**

Means-comparison table, means plot, and mean-comparison plot in an ANOVA report

Index	Mean Difference	Std. Error	DF	t-value	Prob> t
Egg Milk	0	0.24947	93	1.66021	0.04472
Egg Tofu	1	0.13705	93	0.7769	0.94651
Egg Fish	2	-0.02723	93	0.15436	0.99953
Milk Tofu	3	0.42992	93	2.43711	0.31755
Milk Fish	4	0.26564	93	1.50585	0.71117
Tofu Fish	5	-0.16428	93	0.93126	0.9123



“Origin provides a very powerful, comprehensive and useful range of statistics capabilities which go beyond what is offered in many statistical packages. Origin’s ANOVA techniques include all important multiple comparisons tests for means, and a very useful output feature which is rarely found in other statistical packages: automatic creation of means comparison plots which will illustrate significant differences at a glance. A broad range of non-parametric tests is available which include the option of calculating exact p-values based on the exact distribution instead of the asymptotic one, which is very important for small sample size. Also sample size and power calculations are supported.”

Reinhard Bergmann, PhD, Novartis Institutes for Biomedical Research

Nonparametric Tests **PRO**

Several nonparametric tests are available, including:

- One-Sample Wilcoxon Signed Rank
- Paired-Sample Sign
- Paired-Sample Wilcoxon Signed Rank
- Two-Sample Kolmogorov-Smirnov
- Mann-Whitney
- Kruskal-Wallis ANOVA
- Mood’s Median
- Friedman ANOVA

Multivariate Analysis **PRO**

Four commonly used multivariate tools are available:

- Principal Component Analysis
- K-Means Cluster
- Hierarchical Cluster
- Discriminant Analysis

Survival Analysis **PRO**

Choose from the following widely used survival analysis functions:

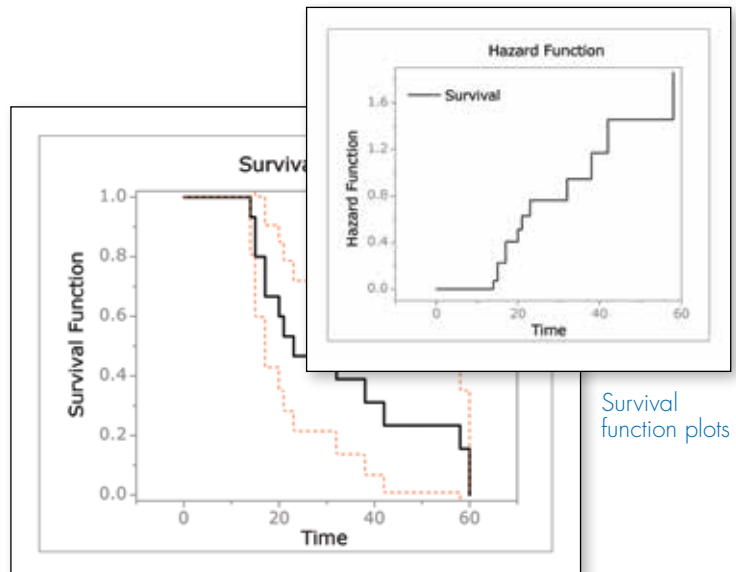
- Kaplan-Meier product-limit estimator, with three equality test methods
- Log-rank
- Breslow
- Tarone-Ware
- Cox Proportional Hazards Model
- Weibull Fit Model

ROC Curves **PRO**

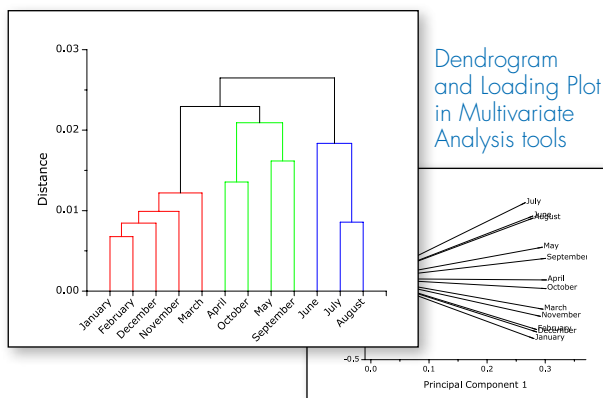
Create Receiver Operating Characteristic (ROC) Curves, summarizing the trade-off between the false-positive and true positive rates for all possible cutoff value.

Power and Sample Size **PRO**

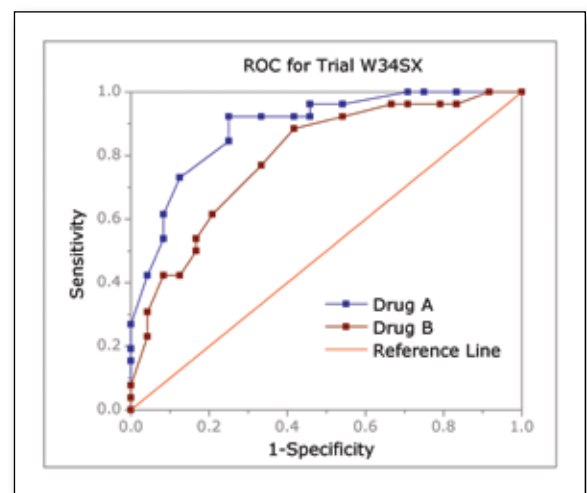
- One-Sample t-Test
- Pair-Sample t-Test
- Two-Sample t-Test
- One way ANOVA



Survival function plots



Dendrogram and Loading Plot in Multivariate Analysis tools



ROC curve comparing two samples

Recalculation of Analysis Results

Origin supports automatic or manual recalculation of results from most analysis and data processing operations. This allows you to easily update results when data or analysis parameters are changed, and avoid having to repeat the procedure from the beginning. The output of one operation can be used as input for another, allowing for a chain of operations and their associated results to be updated.

If the recalculate mode is set to Manual instead of Auto, you can decide when to update the results. The update can be done one operation at a time, or for all pending operations in the current Origin project.

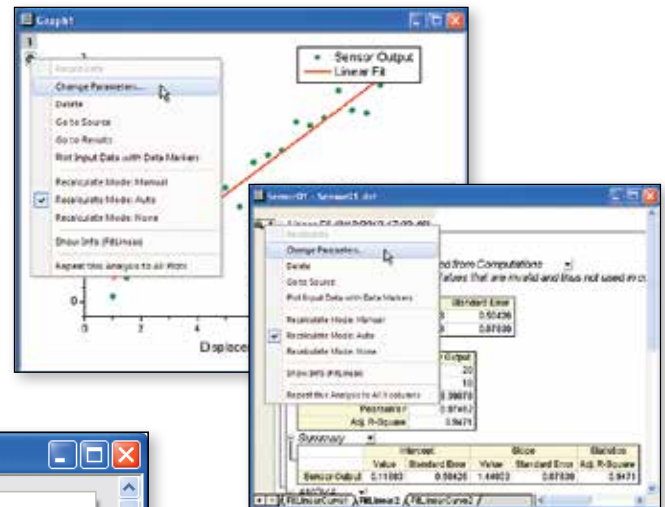
All output sheets, columns, and graphs of operations enabled for recalculation are marked with a green lock icon. This icon provides several context menu options, including a Change Parameters option to re-open the dialog with exact same settings used at the time of creating the output. This allows you to make changes to your analysis settings, and update the results and associated graphs.

The output can also be updated by simply changing input data to the operations. This allows you to either import or copy-paste new data, and easily update all results and associated graphs.

The auto update feature also applies to simple operations such as Set Column Values used to compute new columns. Contents of the new columns are updated when either the input data or the column formula is changed.



The Recalculate drop-down in dialogs offer choice of Auto, Manual, or None



The "Change Parameters..." menu item allows you to re-open dialog and change analysis parameters to repeat the analysis

Long Name	A(X)	B(Y)	C(Y)	D(Y)
Units	sec	mV	mV	
Sparklines				
1	0	20.41	8.23	28.6
2	1	20.35	8.2	28.5
3	2	20.28	8.18	28.4
4	3	20.22	8.15	28.3
5	4	20.16	8.13	28.29
6	5	20.09	8.11	28.2
7	6	20.03	8.08	28.11
8	7	19.96	8.06	28.02
9	8	19.9	8.03	27.93
10	9	19.84	8.01	27.85
11	10	19.77	7.99	27.76
12	11	19.71	7.96	27.67
13	12	19.65	7.94	27.59
14	13	19.59	7.92	27.51
15	14	19.52	7.89	27.41
16	15	19.46	7.87	27.33
17	16	19.4	7.85	27.25

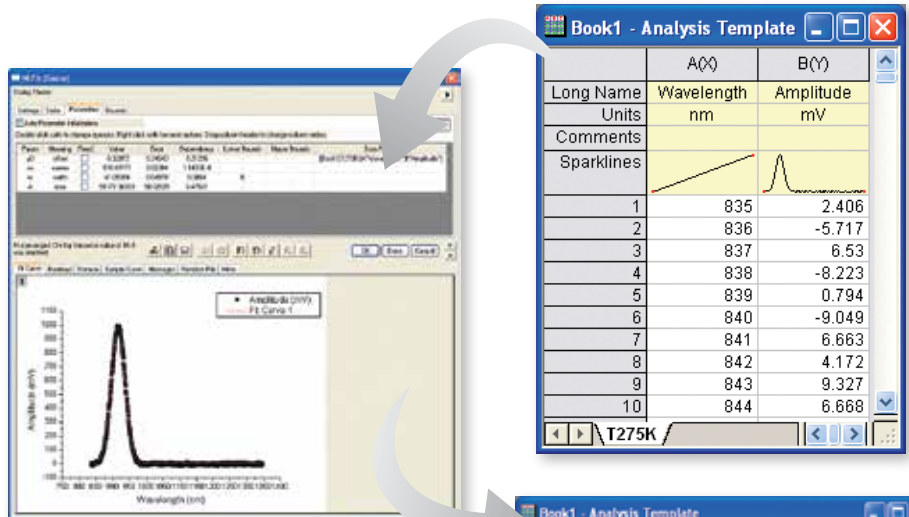
Recalculation can be used with Set Column Values to compute new columns based on raw data. Values in the new columns are updated when raw data or formula is changed

Analysis Templates™ and Batch Processing

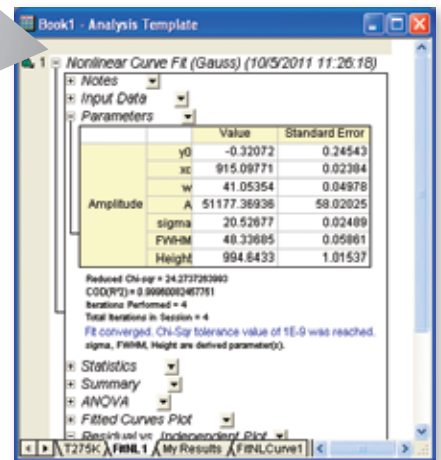
Analysis Templates™

Origin's ability to recalculate results on parameter or data change, can be used to create Analysis Templates for repeat analysis.

Analysis templates can be a single workbook or an entire Origin project. Import data, perform analysis, and optionally create a custom report sheet combining graphs and results. Save the book or project as an Analysis Template, and then re-use to analyze similar data.



Set up your analysis the way you want. After your initial analysis has completed, just save the workbook as an Analysis Template

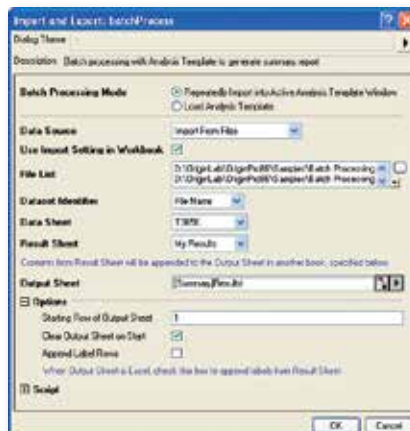


Batch Processing

The Batch Processing tool allows you to perform repeat analysis on multiple datasets using an existing Analysis Template.

Multiple data files from disk can be processed, or the tool can loop over all (or selected) data already existing in your project.

A summary report can be created, with dataset identification, and desired analysis results for each dataset that was processed.



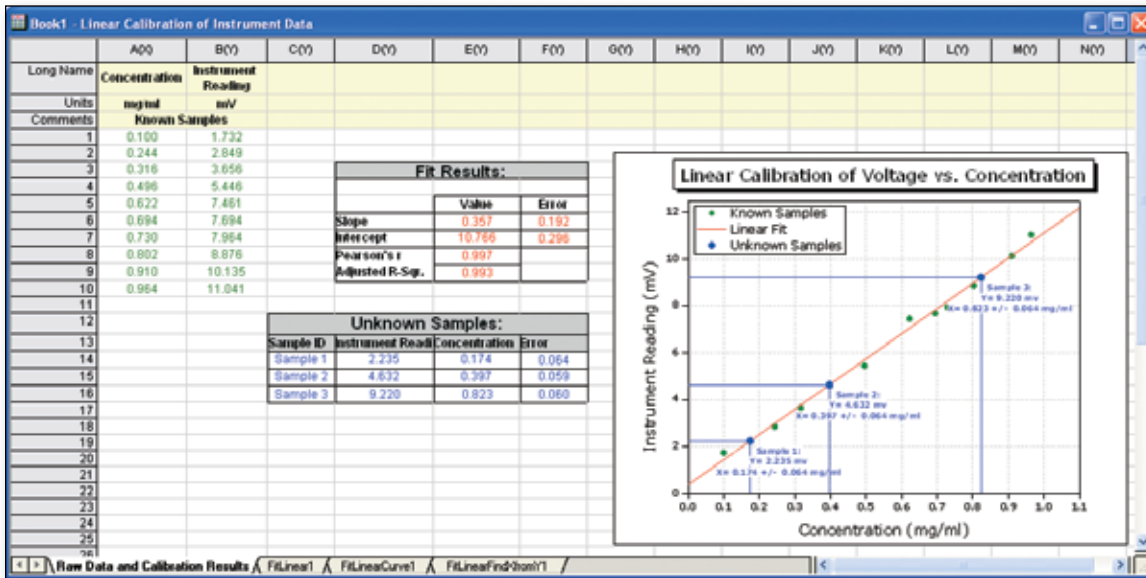
Use your Analysis Template and the Batch Processing dialog to analyze multiple data files or data sets in your project. Create a summary report with data identifier and selected results for each data set

Long Name	Dataset	File Name	Peak Center	Peak Width	Peak Width	Peak Width	Peak Area	Peak Height
Comments			w	sigma	FWHM			
1	T275K.csv	T275K.csv	915.09771	41.05354	20.52677	48.33685	51177.36938	994.6433
2	T285K.csv	T285K.csv	945.89011	43.35595	21.67798	51.04773	53294.13629	980.77809
3	T295K.csv	T295K.csv	977.5276	45.96913	22.98456	54.12451	55298.70742	959.81779
4	T305K.csv	T305K.csv	1009.93406	49.0259	24.51295	57.72359	57616.89048	937.70089
5	T315K.csv	T315K.csv	1043.1428	52.18647	26.08323	61.42132	59406.8903	908.6266
6	T325K.csv	T325K.csv	1077.12324	55.89471	27.94735	65.81099	61038.73221	871.31437
7	T335K.csv	T335K.csv	1111.88461	59.74574	29.87287	70.34523	62487.42014	824.49894
8	T345K.csv	T345K.csv	1147.4859	63.93499	31.9675	75.2777	63416.07431	791.40866
9	T355K.csv	T355K.csv	1183.95578	68.57247	34.20623	80.73791	63700.12042	741.19166
10	T365K.csv	T365K.csv	1221.05614	73.40072	36.70036	86.42274	63447.01932	689.88533

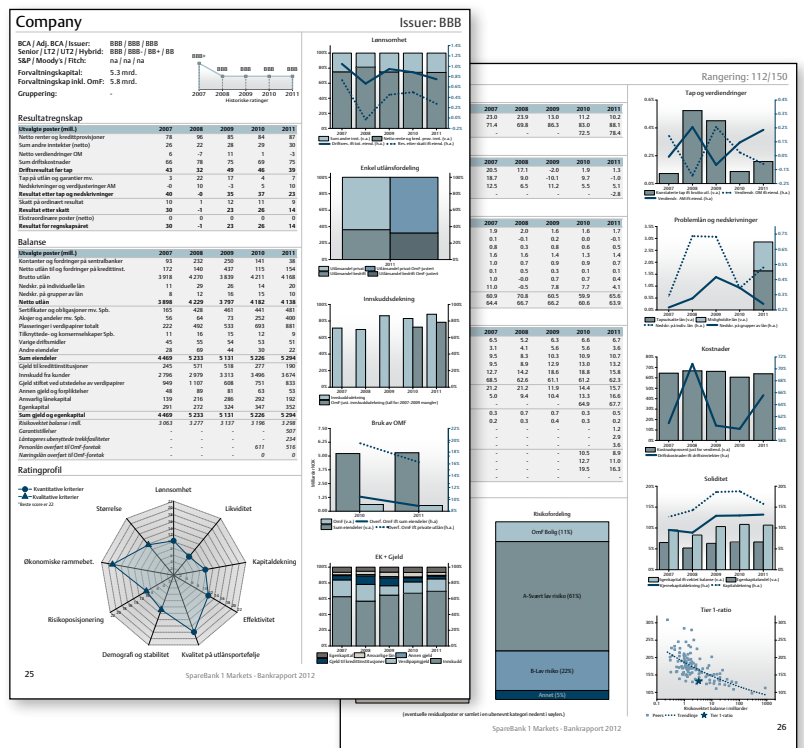
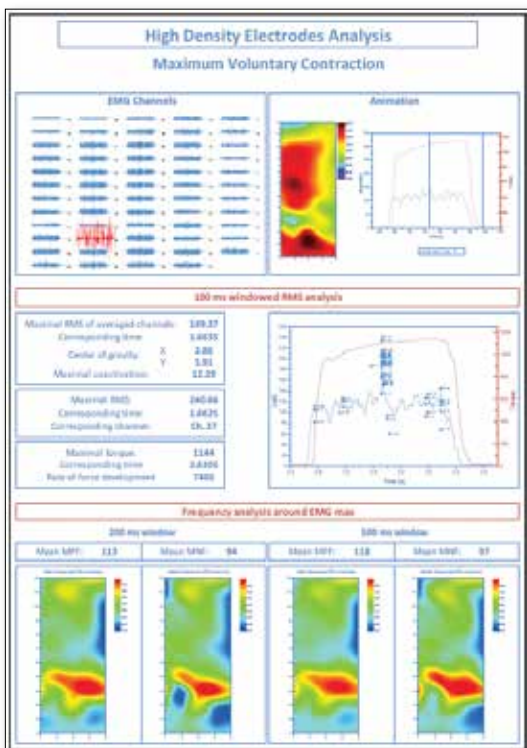
Custom Reports

Use Origin to perform repetitive analysis and create custom reports without any programming.

Origin's new multi-sheet workbooks allow you to format the appearance of cell contents, merge cells and apply borders and other formatting changes. Further, you can paste-link result values from any analysis results and graphs contained in the book or project, thus creating a custom report sheet. With the ability of automatic recalculation of analysis results, your custom report sheets can become templates for repeated tasks—simply import new raw data and watch your custom report automatically update. When your report is ready, export it as a PDF file or as an image file by choosing a popular image format such as EPS and JPEG.



Include data, analysis results and floating graphs in the custom report sheet, it will automatically update when input data is changed



Numerical results, graphs, company logo and other images can all be placed arbitrarily in worksheets to create single or multi-page reports which can then be exported

Publishing

Origin provides a number of tools for preparing files for publication and presentation. Graphs, Worksheets, and Layout pages can be exported with custom settings for publication. Use Origin's built-in slide show capability to present graphs and layout pages, or send to PowerPoint, or copy-paste into other applications. Export graphs, layouts, and worksheets as vector or raster format for submitting to publications.

Exporting Graphs

When you have completed your graph for publication, exporting your final results is very easy with Origin.

- Export presentation quality graphs to a wide variety of formats, including both raster and vector format
- Customize the exporting, to make figures that meet the requirements of publication under a variety of circumstances
- Export graphs to a Microsoft® PowerPoint Slideshow or send graphs directly to a Microsoft® PowerPoint presentation

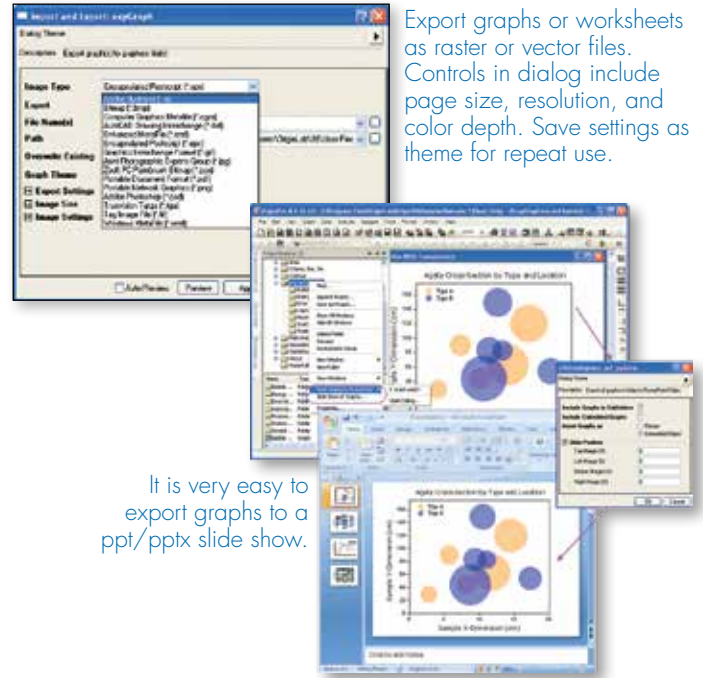
Note that you can also include Origin graphs in other application's files either by pasting or embedding, so that you can later edit these graphs with Origin.

Creating Movies

Origin supports creating movies (AVI file format) from any graph window. A simple tool is provided to configure settings such as compression, and then add individual frames to create the movie. The LabTalk and Origin C programming environments can also be used to create movies, allowing users to integrate movie creation as part of their data processing or computing tasks.

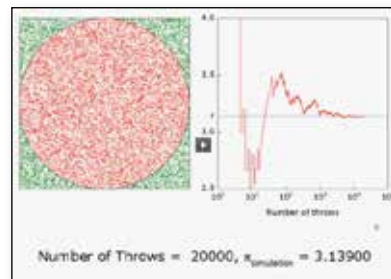
Publishing Custom Reports

Custom reports created by placing numerical results and graphs in Origin worksheet, can be exported as image files. Vector formats such as PDF and raster formats such as PNG are both supported. Reports that occupy more than one page can be exported as multi-page PDF files.

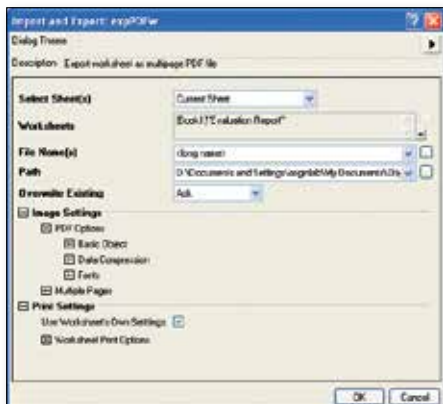


Export graphs or worksheets as raster or vector files. Controls in dialog include page size, resolution, and color depth. Save settings as theme for repeat use.

It is very easy to export graphs to a ppt/ ppx slide show.



Movie displaying value of π being computed using Monte Carlo method



In the export PDF dialog, you may customize the publishing with size, fonts, color translation, multiple page numbering .etc , so that to publish your custom report according to the specific needs

COMPTE-RENDU D'ÉVALUATION
 Test force-vitesse isométrique en squat
 Relations force et puissance-vitesse - Force, vitesse et puissance maximales - Comparaisons

ATHLÈTE
 Informations
 NOM: XXXXX Prénom: XXXX Âge: 22 ans
 Taille: 1.76 m Masse: 66 kg Date du test: 12/03/2012 à 17:04
 Recherche: VEV Date de naissance: 12/08/1990

TEST FORCE-VITESSE
 Baire guidée équipée d'un capteur linéaire de déplacement (Olyn Avance, Kinetics, Mitchell, Australia) - Méthologie validée par Creather et al. 2011 - 2 essais à chaque charge, détente verticale maximale sur l'ensemble de l'amplitude de mouvement

Relation force-vitesse Relation puissance-vitesse

Résultats détaillés et intensités de travail
 Propositions déterminées à partir des relations force (F) et puissance (P) - vitesse (V)

Charge	V	F	P	RFD	Objetif de travail	Charge	Vitesse
kg	m/s	N	W	N/s	kg	m/s	
1	1.6	1406	1861	8566	Vitesse maximale	0	> 2.8
19	1.3	1496	1736	7417	Puissance maximale	0	2.1 - 2.8
31	1	1460	1376	6439	Puissance	0 - 3	1.5 - 2.1
47	1	1578	1410	5651	Force		
64	0.8	1682	1334	4205	Force maximale	101	0.4
79	0.6	1653	1005	2162			
94	0.6	1723	959	1461			

BILAN GÉNÉRAL
 Valeurs références = valeurs moyennes calculées auprès d'une population de même âge, même niveau, même sexe et pratiquant le même sport. Valeurs d'excellence = moyennes = 1 écart-type

	Fmax	Fmax th.	Fmax rel.	FRF	Pmax	Pmax th.	Vopt	Vmax th.	RFDmax
	(N)	(N)	(N/kg)	(W)	(W)	(W/kg)	(m/s)	(m/s)	(N/s)
12/03/2012 à 17:04	1723	2025	30.7	119	1861	2014	28.2	2.1	4.3
06/03/2012 à 16:25	1647	1849	27.9	93	1670	2161	25.2	2.4	4.9
Projet (N)	9	+5	+9	+28	0	-7	0	-13	-13
Référence	1496	1641	25.7	74	1705	1492	26.2	1.2	2.5
Excellence	1750	1937	29.8	110	2448	2271	35.8	4.0	8.0

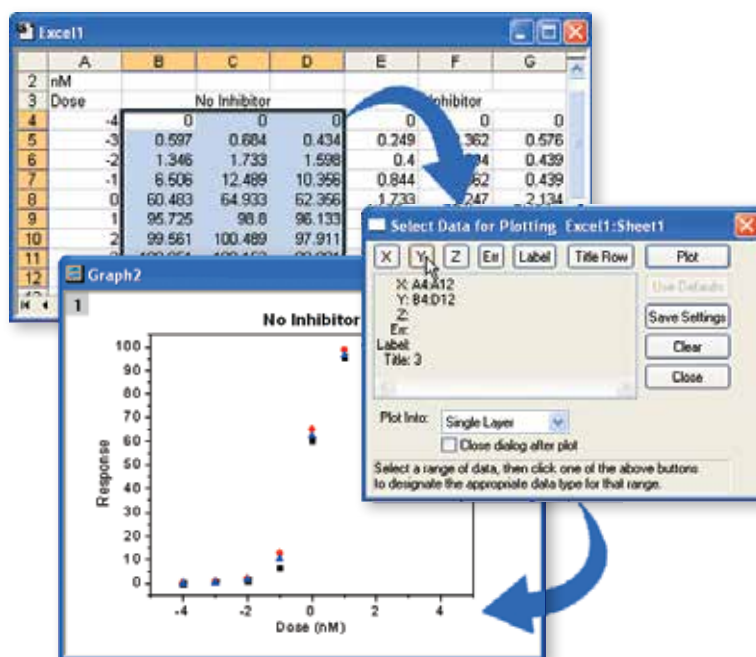
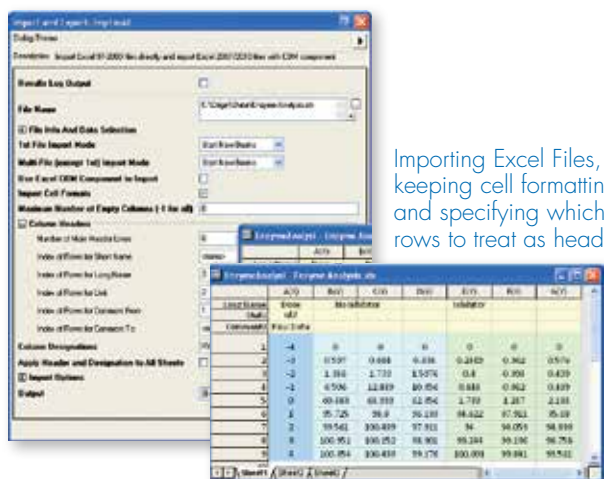
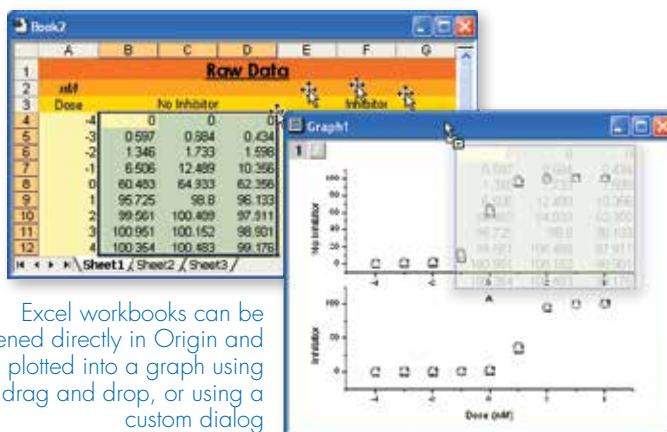
EMax: force maximale EMax th.: Fmax théorique EMax rel.: Fmax relative JRM: répétition maximale RFD: montée en force
 Pmax: puissance maximale Pmax th.: Fmax théorique Pmax rel.: Pmax relative Vopt: vitesse optimale Vmax: vitesse maximale

INSEP - Service Recherche - 11, av. de France 75012 Paris - 01-41-74-30-00
 email: info@insep.fr

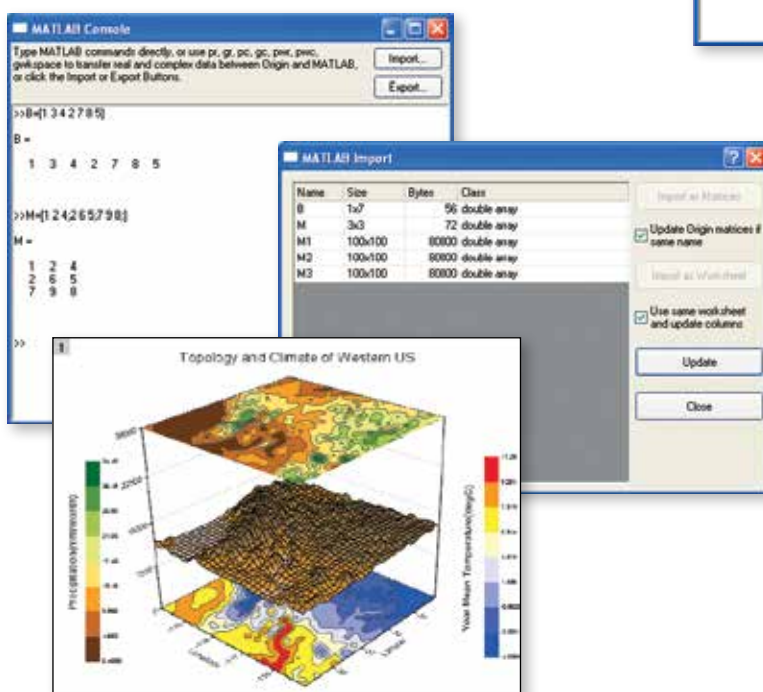
Working with Excel®

Origin provides easy access to your Excel data:

- Copy-paste data from Excel to Origin with full precision
- Import Excel files into Origin worksheets keeping cell formatting and specifying header rows
- Open Excel workbooks directly in Origin
- Optionally save Excel workbooks open in Origin with path relative to the Origin Project (OPJ) file, for easy sharing of OPJ and related Excel files.



MATLAB® Connectivity



Importing MATLAB® Files

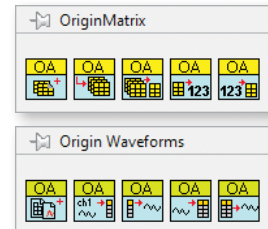
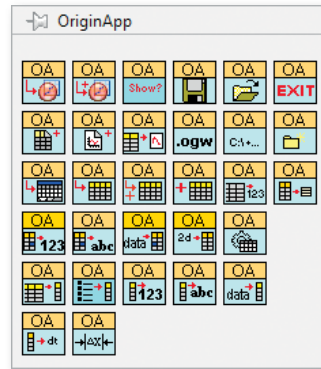
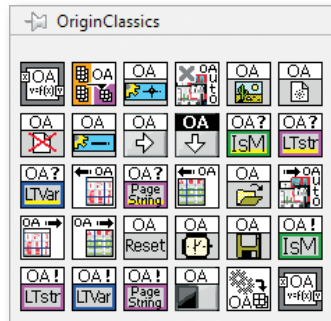
Origin offers a dialog for importing MATLAB® (.mat) files into Origin worksheets and matrices. This import functionality does not require MATLAB® to be installed.

MATLAB® Console

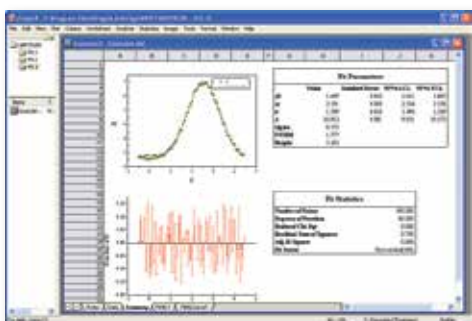
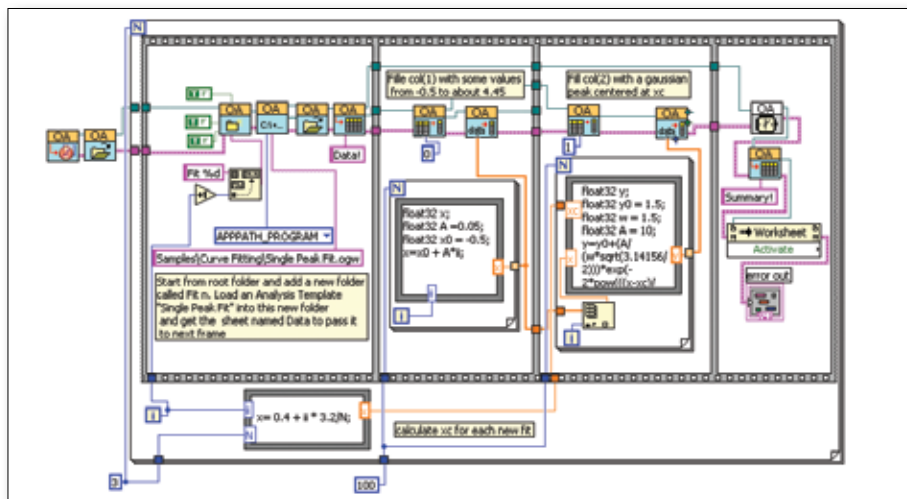
If you have MATLAB® installed, you can use the Console tool to issue MATLAB® commands from within Origin. Buttons and commands are also provided to transfer data from the MATLAB® workspace to Origin, and to create MATLAB® variables from data in Origin worksheet and matrices.

LabVIEW™ Connectivity

Origin provides a collection of custom LabVIEW™ sub-VIs that are included in the installation. LabVIEW™ users can incorporate these custom sub-VIs in their main LabVIEW™ application to communicate seamlessly with Origin. These sub-VIs take advantage of Origin's automation server classes and can be used for operations such as opening and closing communication with Origin, exchanging data between Origin and LabVIEW™, and sending commands to Origin.



LabVIEW™ palettes displaying SubVIs provided with Origin.



The VI diagram above demonstrates an example of how to perform batch analysis of multiple datasets using an Analysis Template in Origin.

In this example, the experimental data has been fitted to a Gaussian curve. The fitted curve, residuals and fit statistics are presented in a user-created report sheet.

Once the VI has executed, the Origin project will have separate subfolders for each dataset. Within each subfolder the Analysis Template will contain the raw data, the analysis results, and the custom report sheet ready for printing or exporting.

“Origin can now really augment LabVIEW's power. The drag-and-drop Origin sub-VIs that come with Origin are simple and easy to use. With Origin's Analysis Templates it is now very simple to create a reusable application that acquires data from third-party instruments, and then passes the data for analysis and report generation to Origin. One can also get curve fit results back into LabVIEW to display in LabVIEW's charts and graphs on the fly. What's best is that this is all accomplished in a native LabVIEW environment.”

James T. Gardner, Ph. D., Chief Engineer, Environmental Instruments, Inc.

Programming

Origin provides two programming languages: LabTalk and Origin C.

LabTalk

LabTalk is a scripting language native to Origin. For simple operations such as manipulating data and automating tasks, LabTalk is a good place to start. You can access a rich set of script commands and functions, including a large collection of X-Functions, to create scripts for your specific needs. Your custom script code can be easily assigned to buttons on graphs or worksheets, new toolbar buttons or custom menu items.

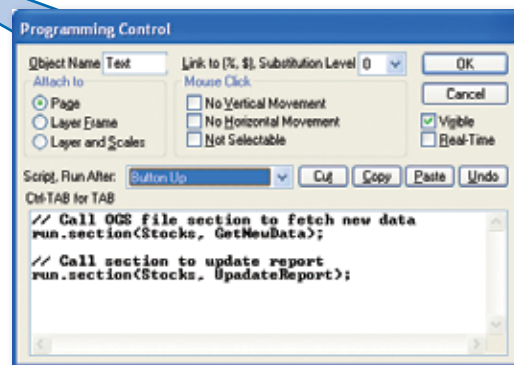
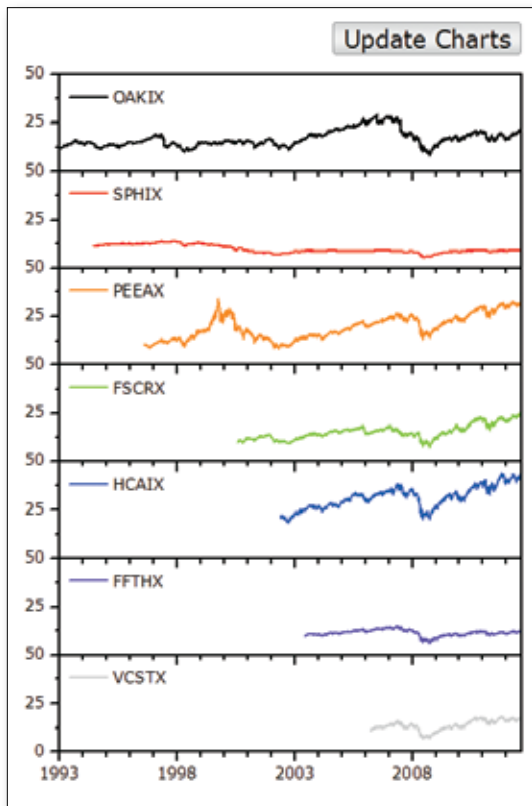
```
Script Window
Function string strFind(dataset ds, string strVal)
{
  string strTest, strResult;
  for( int ii = 1; ii <= ds.GetSize(); ii++)
  {
    if (strTest.Find(strVal) > 0)
    {
      strResult = strResult + (CHR7)(strTest);
    }
  }
  return strResult;
}

string MyResult = strFind(col(2), "hadron");
MyResult;

Function int GetMinMax(range rr, ref double min, ref double max)
{
  STATE st;
  min = state.min;
  max = state.max;
  return state.n
}

double y1, y2;
int nn = getMinMax(1:end, y1, y2);
type "Worksheet has $(nn) points, min=$(y1), max=$(y2)";
```

Classic Script Window displaying LabTalk Script



Origin graph with text label set up as button for executing LabTalk script. The dialog provides controls such as event handling, and the script to be executed on button-click.

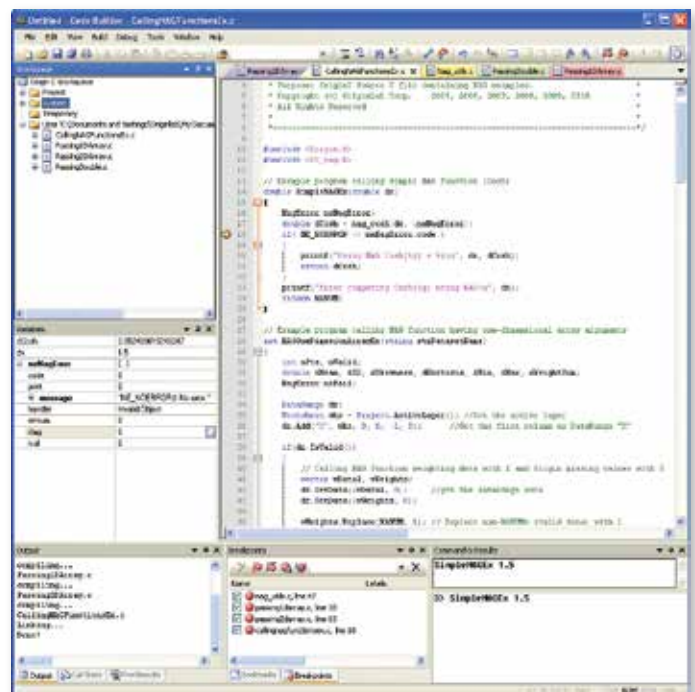
Origin C

Origin C is a programming language based on ANSI C, including additional support for C++ and C# features.

With Origin C, you can:

- Create and access properties of all Origin objects such as worksheets, matrices and graphs
- Automate your data analysis and graphing tasks
- Link to external dynamic link libraries (DLL)
- Call C or Fortran library routines, such as the NAG library functions included with Origin, or other public-domain libraries

Origin provides a state-of-the-art integrated development environment called Code Builder for managing your Origin C projects.

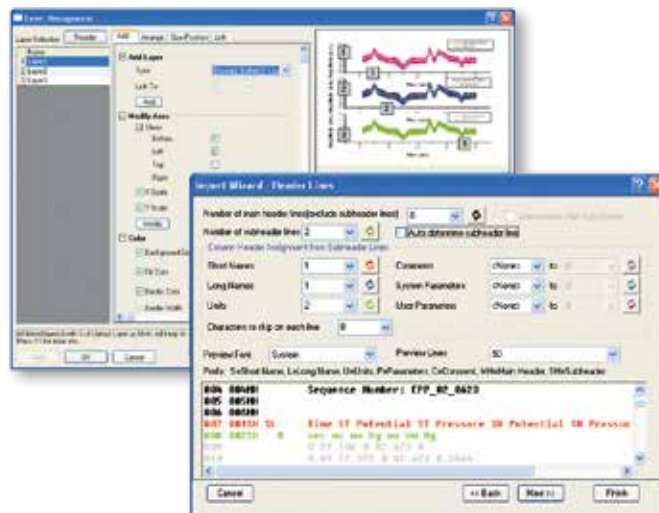


Origin C code displayed in Code Builder, Origin's integrated development environment

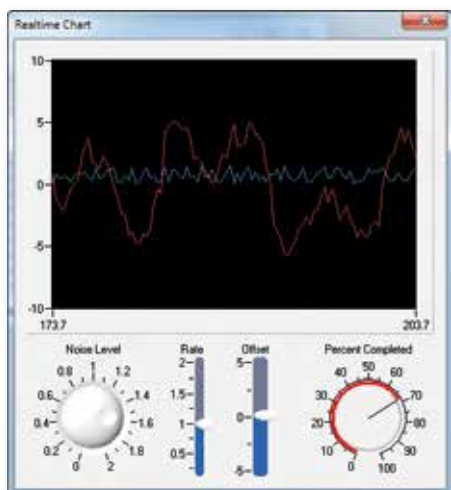
Building Dialog

The Developer Kit is a built-in capability in Origin that allows you to access complex dialog boxes, floating tools and wizard resources created using external compilers such as Microsoft Visual C++. Resource elements can be accessed and controlled from Origin C.

Custom tools can be packaged with associated files using Origin's Package Manager tool for sharing. The package can simply be dragged and dropped onto another Origin installation to add the custom capability.



Dialogs created with Origin C (Developer Kit)



Dialog with National Instruments (TM) ActiveX Controls



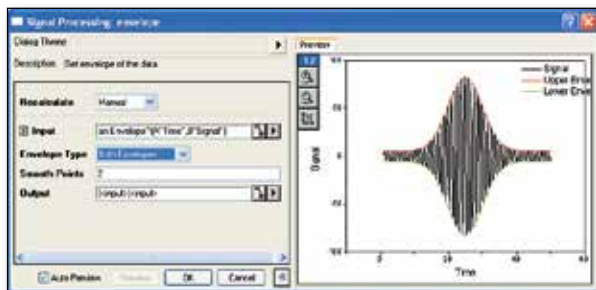
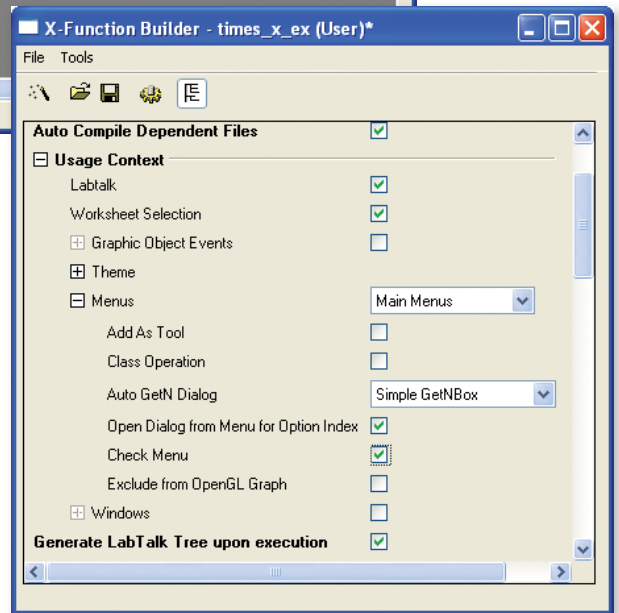
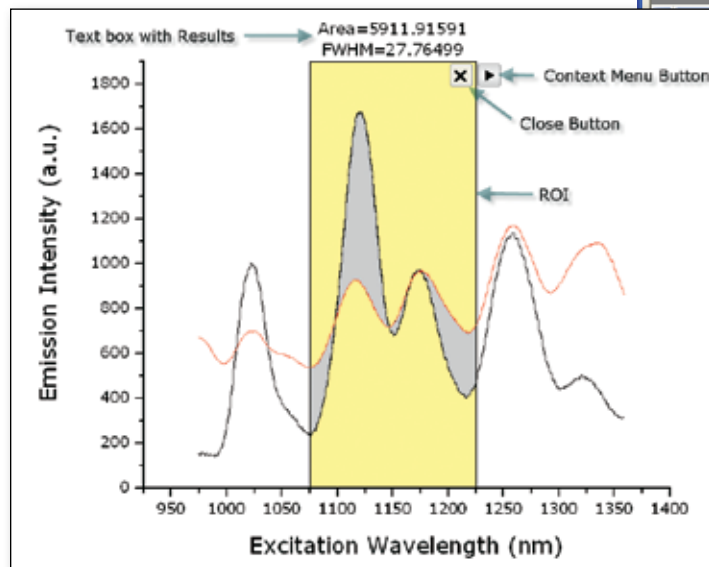
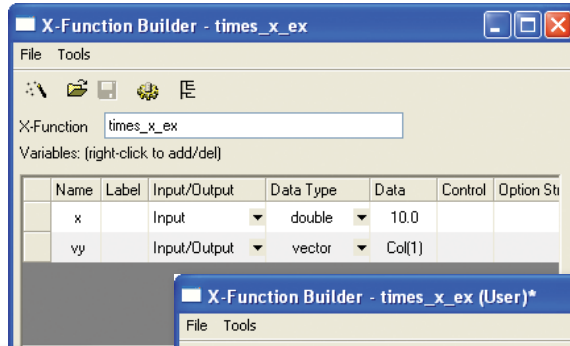
Origin/OriginPro includes the complete NAG Mark 9 numerical library. This library provides proven numerical functions in areas such as Statistics, Linear Algebra, Regression, Fourier transforms and much more. All functions are accessible from Origin C, and this allows you to develop complex applications that require advanced numerical calculations.

- Complex Arithmetic
- Zeros of Polynomials
- Roots of One or More Transcendental Equations
- Fourier Transforms
- Wavelet Transforms
- Quadrature
- Ordinary Differential Equations
- Partial Differential Equations
- Mesh Generation
- Interpolation
- Curve and Surface Fitting
- Minimizing or Maximizing a Function
- Global Optimization of a Function
- Linear Algebra
- Matrix Factorizations
- Eigenvalues and Eigenvectors
- Determinants
- Simultaneous Linear Equations
- Linear Algebra Support Functions
- Linear Equations (LAPACK)
- Least-squares and Eigenvalue Problems (LAPACK)
- Large Scale Linear Systems
- Large Scale Eigenproblems
- NAG Interface to BLAS
- Simple Calculations on Statistical Data
- Correlation and Regression Analysis
- Multivariate Methods
- Analysis of Variance
- Random Number Generators
- Univariate Estimation
- Nonparametric Statistics
- Smoothing in Statistics
- Contingency Table Analysis
- Survival Analysis
- Time Series Analysis
- Operations Research
- Sorting and Searching
- Approximations of Special Functions
- Mathematical Constants
- Machine Constants
- Input/Output Utilities

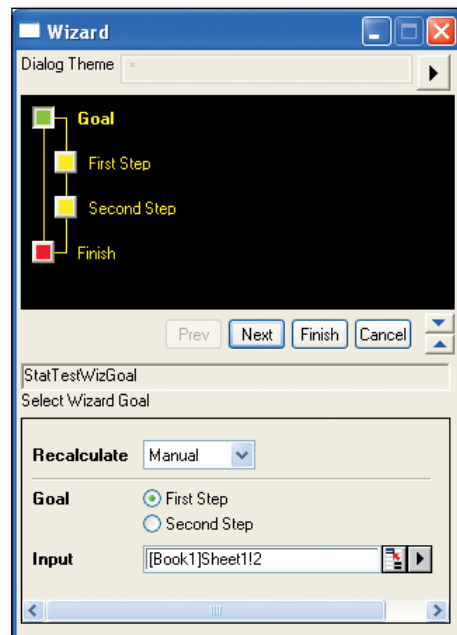
Programming

X-Functions

X-Functions provide a framework for building custom tools in Origin. Simply define what controls you want in your dialog and Origin will create the tool from your definition. You provide the Origin C code to be executed by the tool for performing your custom task. Once an X-Function is created, it can be placed in the Origin menu, accessed from LabTalk script, and shared with other Origin users.



X-Function dialog with preview panel



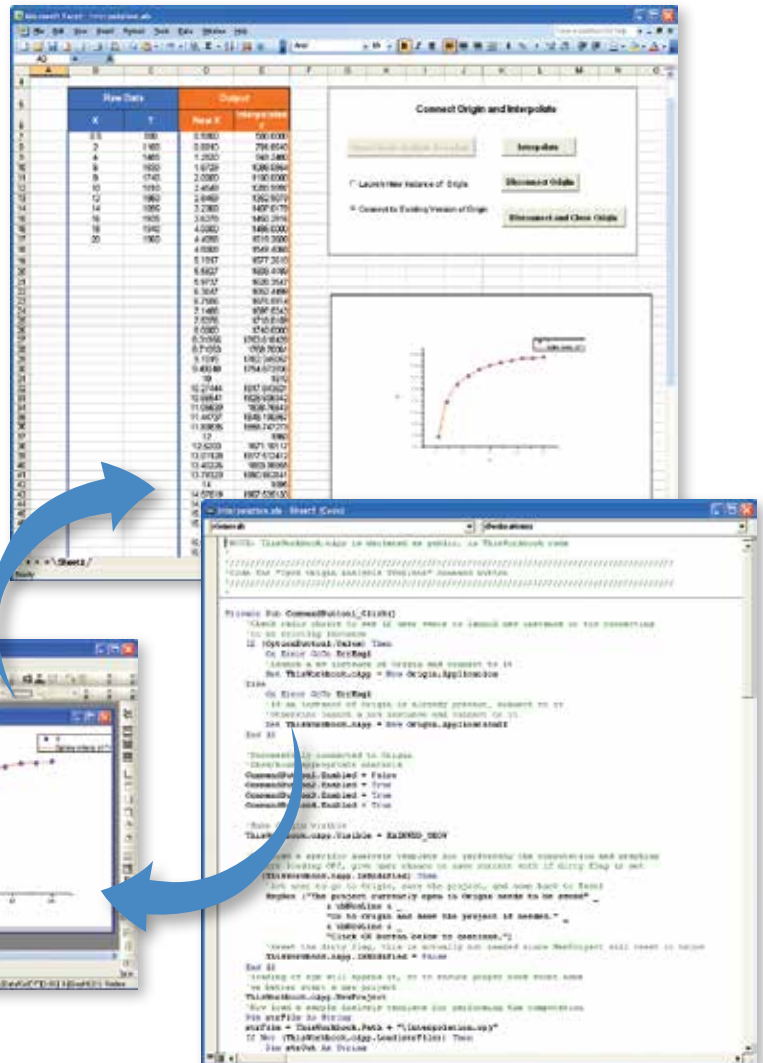
Wizard created with X-Functions

Automation Server

Origin can be accessed as an automation server from client applications such as Excel, LabVIEW™, MATLAB®, or custom tools built using Visual Basic or Visual C++ .NET. Data can be streamed into Origin and graphed, and tools in Origin such as Gadgets can be used to perform analysis on the incoming data. Post analysis of data can also be performed by pushing data into Analysis Templates.

This example illustrates connecting an Excel Client application to Origin:

- Origin is launched and a previously customized Origin Project is opened
- Data is sent from Excel to Origin
- Analysis results are automatically updated by Origin on data change
- Analysis results and graph images are fetched back to Excel from Origin



Orglab

Orglab is a freely distributed component DLL for directly creating or reading Origin Project s (.OPJ) and Origin Window files (.OGG, .OGW and .OGM). An Origin license is not required to use Orglab, and this enables equipment manufacturers and other third-party vendors to save their data as Origin file types.

Download for free at: originlab.com/Orglab8



The Origin Viewer is a freely distributed stand-alone application created using the Orglab component DLL. The Viewer allows you to view Origin Project files on computers that do not have Origin installed.

Download the Viewer for free: originlab.com/Viewer

User Case Studies

Origin as a Financial Reporting Tool

Ariel Fischer, Quantitative Analyst, SpareBank 1 Markets AS, Oslo, Norway

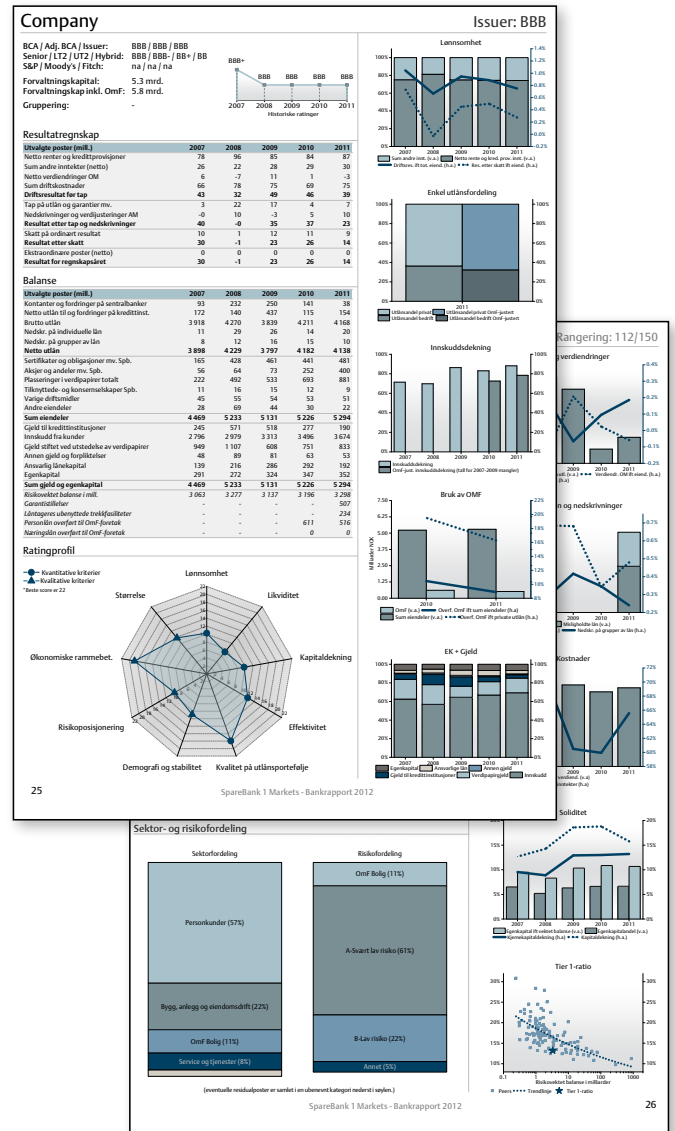
Ariel Fischer and his team are using Origin to construct complex analytical reports that support easy access to financial models and data from different parts of the organization.

Origin met all of their requirements:

- Be flexible, scalable, and easy to modify
- Support automation
- Output publication quality reports
- Handle large amounts of data
- Support different input/output interfaces
- Interface with MATLAB®
- Provide aesthetically pleasing reports

This solution has been used to create a credit rating report of 150 Nordic banks. The report is designed to include a summary of financial reports of each bank as well as present and explain the derived credit rating from the underlying credit model. In addition, analysis of aggregated statistics is presented as a function of time. Once new financial data is registered in their data warehouse, an updated credit rating report will be created by the click of a button.

Ariel Fischer says: "The most central Origin feature in this project is the COM-server functionality combined with Origin C and LabTalk, which allows for a seamless integration of Origin with our existing data storage and analysis tools. Additional powerful features of Origin that were utilized include: worksheet queries, animation creation, built-in statistical functions and the import interface. Origin proved to be all-in-all the smoothest way to manage the different elements in the report. The quality of the output is beyond what I have seen in other graphing/analysis-software."



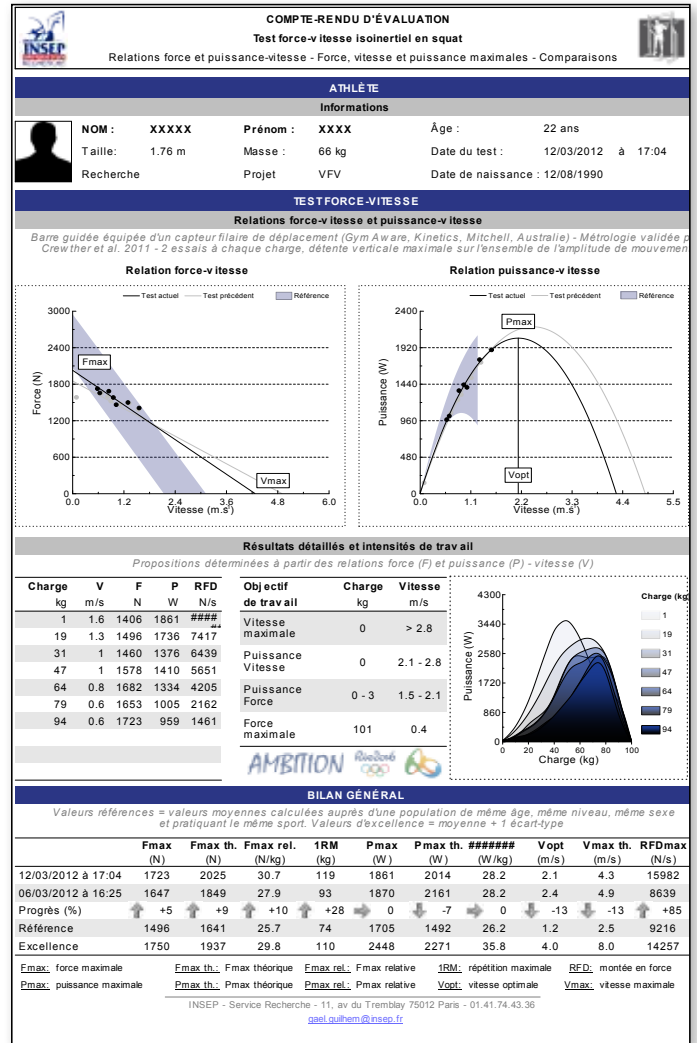
View more user case studies at: originlab.com/UserCaseStudies

Using Origin to Analyze and Report on Athlete Performance

Antoine Couturier and Sylvain Dorel, researchers at the Institut National du Sport, de l'Expertise et de la Performance in France, have been using the expanded functionality of the Origin Worksheet to produce clean, professional reports for trainers and athletes to review progress in their training regimens.

The researchers import all of the relevant data from the ergocycle into a custom Origin Analysis Template. The report sheet then automatically fills with the athlete's information, converts the raw data from the ergocycle to Newtons according to ergocycle calibration, detects cycles and half-cycles and computes mean forces, pedaling rates and powers for each of them. All the data corresponding to forces and power vs. pedaling rate are dynamically plotted and fitted using the Analysis Template.

Antoine Couturier says: "Origin is our number one software for visualizing and analyzing experimental data. Starting from version 8, with the introduction of analysis templates and custom report, Origin has also become a fantastic tool for scientific coaching of our athletes from the National Institute of Sports, in many disciplines. Most of the data recorded during the testings are simply drag and dropped into Origin. In a matter of minutes, a database is updated and a complete report is generated for the coaches, including athlete's own progression and comparison to others. Those unique features have been constantly evolving and allowed us to gain considerable firepower."

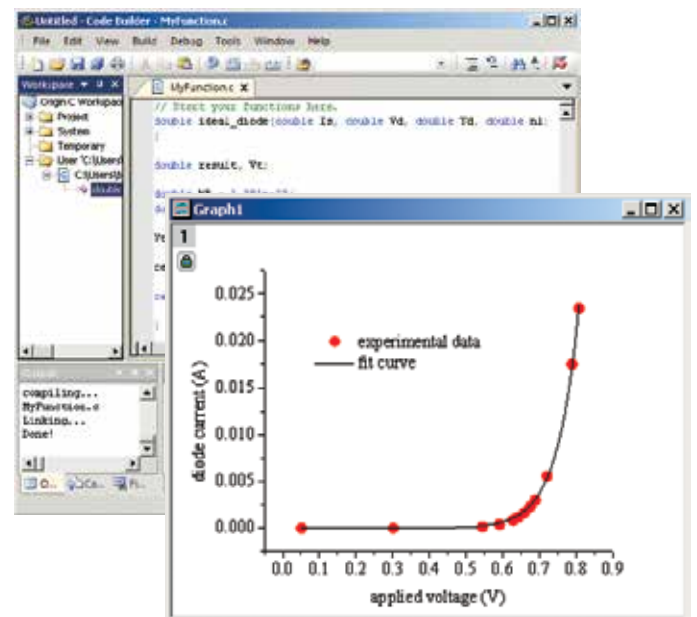


Integrating Origin in a Lab Course

Alexei Grigoriev has used Origin for years in his research in experimental condensed matter physics.

Recently, Dr. Grigoriev has discovered that Origin can be an effective teaching tool as well. He has integrated Origin into the curriculum of the Physics Instrumentation Lab course that he teaches.

Alex Grigoriev says: "Origin helps students to better understand and practice data analysis, the critical step between collecting data and reporting results. Students learn basics of scientific programming, experimental data fitting, and system behavior simulation. Origin allows to integrate three major components of engineering and research, - data collection, analysis, and reporting, - in a single environment."



Comparison of Origin and OriginPro

OriginPro provides all of the features of Origin, plus additional analysis tools and capabilities. The following tables provide comparisons between Origin and OriginPro in such areas as curve fitting, peak analysis, statistics, signal analysis, and image handling.*

Curve Fitting		Origin	OriginPro
Linear and Polynomial Fitting	Linear Regression	✓	✓
	Linear Fit with X Error		✓
	Confidence Ellipse for Linear Fit	✓	✓
	Polynomial Regression	✓	✓
	Multiple Linear Regression	✓	✓
	Partial Leverage Plots in Multiple Regression	✓	✓
	Residual Analysis	✓	✓
Nonlinear Fitting	Fitting Multiple Datasets	✓	✓
	Built-in Fitting Function and User-defined Fitting Function	✓	✓
	Parameter Initialization and Derived Parameter Definition	✓	✓
	Bounds and Constraints	✓	✓
	Weighted Fitting	✓	✓
	Fitting with Error	✓	✓
	Global Fit with Parameter Sharing	✓	✓
	Fitting Replica Data	✓	✓
	Residual Analysis	✓	✓
	Orthogonal Regression for Implicit Functions		✓
	Fitting Comparison		✓
	Surface Fitting		✓
	Mathematics		Origin
Simple Mathematics Operations	Simple Mathematics Operations on or Between Datasets	✓	✓
	Set Column or Matrix Values by Using Mathematics Operations	✓	✓
	Normalization	✓	✓
Interpolation and Extrapolation	1D Interpolation and Extrapolation	✓	✓
	Interpolation and Extrapolation of Y From X	✓	✓
	Trace Interpolation on XY Data		✓
	Trace Interpolation on XYZ Data	✓	✓
	2D Interpolation and Extrapolation		✓
	3D Interpolation		✓
Differentiation and Integration	Numerical Differentiation	✓	✓
	1D Numerical Integration	✓	✓
	2D Volume Integration		✓
Area Calculation	Polygon Area	✓	✓
	XYZ Surface Area		✓
	Matrix Surface Area		✓
Others	Average Multiple Curves	✓	✓
	Inverse of a Matrix	✓	✓

Statistics		Origin	OriginPro
Descriptive Statistics	Basic Descriptive Statistics	✓	✓
	1D and 2D Frequency Counts	✓	✓
	Correlation Coefficient		✓
	Discrete Frequency		✓
	Normality Test (Shapiro-Wilk, Lilliefors, Kolmogorov-Smirnov, Anderson-Darling, D'Agostino-K Squared, Chen-Shapiro)	✓	✓
	Normality Test (Lilliefors, Kolmogorov-Smirnov)		✓
	Statistics Charts: Histogram, Box Chart, Scatter Matrix, QC Chart, Probability Plot, Q-Q Plot, and Pareto Chart	✓	✓
	Grubbs Test and Q-test to Detect Outliers	✓	✓
Hypothesis Testing	One Sample and Two-Sample t-Test, Pair-Sample t-Test	✓	✓
	One Sample and Two Sample Hypothesis Tests for Variance		✓
	Welch Corrected t-Test	✓	✓
Analysis of Variance	One Way ANOVA, Two Way ANOVA	✓	✓
	ANOVA: Mean Comparison (Tukey, Bonferroni, Scheffe)	✓	✓
	One Way and Two Way Repeated Measure ANOVA		✓
	ANOVA: Mean Comparison (Dunn-Sidak, Fisher LSD, Holm-Bonferroni, Holm-Sidak)	✓	✓
Nonparametric Tests	Sign Test		✓
	Wilcoxon Test for One Sample and Paired Sample		✓
	Two Sample Kolmogorov-Smirnov Test		✓
	Mann-Whitney Test		✓
	Kruskal-Wallis ANOVA		✓
	Mood's Median Test		✓
	Friedman ANOVA		✓
Multivariate Analysis	Principal Component Analysis		✓
	Cluster Analysis		✓
	Discriminant Analysis		✓
	Canonical Discriminant Analysis		✓
Survival Analysis	Kaplan-Meier Estimator		✓
	Test Equality of Survival Functions (Log-Rank, Breslow and Tarone-Ware)		✓
	Cox Proportional Hazard Model		✓
	Weibull Fit		✓
Power and Sample Size	One, Two and Paired-Sample t-Test, One Way ANOVA		✓
ROC Curve	ROC Curve		✓
Peak Analysis		Origin	OriginPro
Peak Analysis	Baseline Detection	✓	✓
	Baseline Subtraction	✓	✓
	Peak Finding	✓	✓
	Peak Integration	✓	✓
	Peak Fitting	✓	✓
	Fit Baseline with Peaks		✓
	Fit Individual Peaks with Different Fitting Functions		✓
	Batch Peak Analysis		✓

Signal Analysis		Origin	OriginPro
Smoothing and Filtering	Smoothing using Savitzky-Golay Filter, Adjacent Averaging, FFT Filter, and Percentile Filter	✓	✓
	FFT Filters: Low Pass, Low Pass Parabolic, High Pass, Band Pass, Band Block, and Threshold	✓	✓
	IIR Filter Design		✓
Fast Fourier Transform (FFT)	FFT	✓	✓
	2D FFT and 2D FFT Basic Filtering		✓
	Short-Time Fourier Transform (STFT)		✓
Wavelet Analysis	Discrete Wavelet Transform (DWT) and Inverse Discrete Wavelet Transform (IDWT)		✓
	Wavelet Smoothing		✓
	Wavelet Denoising		✓
	Continuous Wavelet Transform (CWT)		✓
	Evaluation of Continuous Wavelet Function		✓
Others	Convolution and Deconvolution	✓	✓
	Coherence		✓
	1D Correlation	✓	✓
	2D Correlation		✓
	Hilbert Transform		✓
	Signal Envelope		✓
	Signal Decimation		✓
	Rise and Fall Time Analysis		✓
Data Manipulation		Origin	OriginPro
Reorganization	Sort Worksheet or Columns	✓	✓
	Stack and Unstack Columns	✓	✓
	Pivot Table	✓	✓
	Split Worksheet	✓	✓
Transformation	Converting XYZ Data to a Matrix	✓	✓
	Transpose Worksheet or Matrix	✓	✓
	Shrink or Expand a Matrix	✓	✓
Extraction and Reduction	Worksheet Query	✓	✓
	Reduce Duplicate X Data	✓	✓
	Reduce Data by Skipping Every N Points	✓	✓
	Reduce Data to Evenly Spaced X		✓
	Reduce XY Data by Group		✓
Others	Find and Replace Numeric and Text Values	✓	✓
	Translate Curve Vertically or Horizontally	✓	✓
	Excel-Like Data Filtering		✓

Image Handling		Origin	OriginPro
Image Adjustments	Brightness	✓	✓
	Contrast	✓	✓
	Gamma	✓	✓
	Hue	✓	✓
	Invert	✓	✓
	Saturation	✓	✓
	Histogram Contrast	✓	✓
	Histogram Equalization	✓	✓
	Auto Leveling	✓	✓
	Color Level	✓	✓
	Function Look Up Table		✓
	Leveling		✓
	Balance	✓	✓
	Color Replace	✓	✓
	Arithmetic Transforms	Alpha Blend	
Extract to XYZ			✓
Image Simple Math			✓
Math Function			✓
Morphological Filter			✓
Pixel Logic			✓
Replace Background			✓
Subtract Background			✓
Subtract Interpolated Background		✓	
Image Conversion	Convert Image to Data	✓	✓
	Convert Color Image to Grayscale	✓	✓
	Convert Data to Image	✓	✓
	Binary and Auto Binary	✓	✓
	Dynamic Binary		✓
	Threshold		✓
	RGB Merge / RGB Split		✓
	Image Scale		✓
	Image Palette	✓	✓
	Geometric Transforms	Auto Trim Image	✓
Crop Image		✓	✓
Flip Image Horizontally or Vertically		✓	✓
Offset Image		✓	✓
Resize Image		✓	✓
Image Rotation		✓	✓
Shear Image		✓	✓
Spatial Filters	Average Filter, Gaussian Filter, and Median Filter	✓	✓
	Add Random Noise to Image	✓	✓
	Edge Detection	✓	✓
	Increase or Decrease Image Sharpness	✓	✓
	Apply Unsharp Mask	✓	✓
User-Defined Spatial Filter		✓	

*To view the complete list of comparison tables go to: originlab.com/ProductComparison

Key Features by Version

Use the following tables to check what new features have been added to Origin, compared to your version.**

Origin Interface	9	8.6	8.5*	8.1	8	7.5
Floating Graphs in Worksheet	✓					
Much Faster Performance of Plotting and Editing	✓					
Native 64-Bit and 32-Bit Application	✓	✓				
Auto-Hide Project Explorer Window and Other Dockable Windows	✓	✓				
New Message Log Window	✓	✓				
Excel-Style Horizontal and Vertical Dividers to Split Worksheet	✓	✓	✓			
Zoom and Pan on Graphs, Worksheets, Matrices and Layouts	✓	✓	✓			
Embed and Edit Microsoft Word, Excel and Equation Objects Inside Graphs and Layouts	✓	✓	✓			
Customizable Data Info Display Window	✓	✓	✓			
Thumbnail and Metadata Support for Matrix	✓	✓	✓			
Password Protection for Project, and Audit Log of Project Save with Optional Password Protection	✓	✓	✓	✓		
Graph Types	9	8.6	8.5*	8.1	8	7.5
3D Surface/Bar Plot From Worksheet XYZ Columns	✓					
3D Parametric Function Plot	✓					
3D Scatter/Bar Plot with Z Error Bars	✓					
Improved Scatter Matrix	✓					
Radar/Spider Chart	✓	✓				
2D/3D Function Plot and 2D Parametric Function Plot	✓	✓				
Contour Profile Plot from Worksheet Data with Uneven Spacing (Virtual Matrix or XYZ Columns)	✓	✓	✓			
3D Vector Plot	✓	✓	✓			
Ternary Contour Plot	✓	✓	✓	✓		
Probability Plot and Q-Q Plot	✓	✓	✓	✓		
Polar Contour Plot	✓	✓	✓	✓	✓	
Importing	9	8.6	8.5*	8.1	8	7.5
Specify Channel When Import MDF, NITDM, DIAdem, Prism, pClamp, MATLAB® Data	✓					
File Import Menu Customization Dialog	✓	✓				
Digitizer Tool	✓	✓	✓			
SQL Editor for Database Import	✓	✓	✓			
Import Data in Unicode ASCII, CDF, and HDF5 Formats	✓	✓	✓	✓		
Import Excel, Multi-Line CSV and Binary 2D Array	✓	✓	✓	✓	✓	
3rd Party Formats Support for pCLAMP 2.0, NI DIAdem/TDM, ETAS MDF, CAMP-DX, NetCDF, etc.	✓	✓	✓	✓	✓	
Graphically Construct SQL Queries	✓	✓	✓	✓	✓	
ASCII and Binary Import Wizard Provides Visual Feedback during Import	✓	✓	✓	✓	✓	✓
Drag-and-Drop Data File from Windows Explorer into Origin	✓	✓	✓	✓	✓	✓

Data Manipulation	9	8.6	8.5*	8.1	8	7.5
Excel-Like Data Filtering	✓					
Split a Worksheet into Multiple Worksheets by Number of Columns/Rows, or by Column Label	✓	✓				
Pivot Table Improvements	✓	✓	✓			
Stack Columns and Unstack Columns Improvements	✓	✓	✓			
XYZ Gridding in Logarithmic Scale	✓	✓	✓			
Reduce XY Data by Group, Reduce Data to Evenly Spaced X	PRO	PRO	PRO	PRO		
Reduce Duplicate X Data, Reduce Data by Skipping Every N Points	✓	✓	✓	✓		
New Find and Replace Tool for Numeric and Text Values	✓	✓	✓	✓		
Convert Table-Like Data into XYZ Columns	✓	✓	✓	✓	✓	
Worksheet Query (Extract Values from Worksheet)	✓	✓	✓	✓	✓	
Graph Customization	9	8.6	8.5*	8.1	8	7.5
Manually Move 3D Planes Along the Axis Direction	✓					
Ability to Shift 3D Plot in Z Direction Using Percent of Scale Range	✓					
Move, Rotate and Resize 3D Graphs in an Intuitive Way	✓					
3D Surface Improvements: Lighting Effect, Mesh	✓					
Support Reverse Axes for Ternary Plots	✓					
New Axis Dialog for 3D Graphs	✓					
Output Distribution Curve Data and Parameters to Bin Worksheet for Histogram Plot	✓	✓				
Axis Tick Locations from Dataset	✓	✓	✓			
Transparency and Gradient Fill Control for Graph Objects	✓	✓	✓			
Non-Linear Z-Axis and Y- and Z-Value Colormap Support for Waterfall Plots	✓	✓	✓			
Multiple Intersecting Surfaces in 3D Graphs	✓	✓	✓			
Exporting	9	8.6	8.5*	8.1	8	7.5
Creating Movies from Origin Windows using GUI Tool or Script	✓					
Graph Export Supports Transparency for PDF and EPS Format	✓	✓	✓			
Export All Graphs to PowerPoint	✓	✓	✓	✓		
Export Worksheet as Multi-Page PDF Document	✓	✓	✓	✓		
Export ASCII Data to Existing File by Appending or Replacing	✓	✓	✓	✓		
Slide Show Graphs and Layouts	✓	✓	✓	✓		
Export Worksheet as Image, WAV, NI TDM/TDMS File	✓	✓	✓	✓	✓	
Graph Export Formats Include: AI, CGM, EPS, TIFF, PDF, JPEG, EMF, PSD, etc.	✓	✓	✓	✓	✓	✓
Export Image to Raster File Format	✓	✓	✓	✓	✓	✓

**To view the complete list of reasons to upgrade go to: originlab.com/VersionComparison

General Analysis	9	8.6	8.5*	8.1	8	7.5
Support Data With Y Error in Batch Processing	✓					
User Defined Data Identifier in Report Sheets	✓					
Repeat Analysis on All Plots in Graph or All Columns in Worksheet	✓	✓				
Batch Processing with Summary Report Using Analysis Templates™	✓	✓	✓	✓		
Batch Peak Fitting of Multiple Datasets Using Peak Analyzer Theme	PRO	PRO	PRO	PRO		
Generate LabTalk Script Command from Current Dialog Settings	✓	✓	✓	✓		
Analysis Templates™ with Custom Report Sheets for Repeat Analysis	✓	✓	✓	✓	✓	
Consolidated Reports with Collapsible Tables	✓	✓	✓	✓	✓	
Theme Support for Saving Dialog Settings	✓	✓	✓	✓	✓	
Recalculation of Results on Data or Parameter Change	✓	✓	✓	✓	✓	
Run Analysis with Theme Settings Without Opening Dialog	✓	✓	✓	✓	✓	
Gadgets	9	8.6	8.5*	8.1	8	7.5
Global Vertical Cursor Gadget Across Graphs	✓					
Intersect Gadget	✓	✓				
Quick Sigmoidal Fit Gadget	✓	✓				
Cluster Gadget	PRO	PRO	PRO			
Quick Peaks Gadget	✓	✓	✓			
Differentiate and Interpolate Gadget	✓	✓	✓			
Quick Fit Gadget	✓	✓	✓	✓		
Rise Time Gadget	PRO	PRO	PRO	PRO		
Integrate, FFT and Statistics Gadget	✓	✓	✓	✓		
Peak Analysis	9	8.6	8.5*	8.1	8	7.5
Add More Baseline and Peak Finding Methods	✓	✓				
Multiple Peak Fit Tool Improvements	✓	✓	✓			
Improved Peak Analyzer Wizard	✓	✓	✓			
Batch Peak Fitting	PRO	PRO	PRO	PRO		
Peak Analyzer: Fit Individual Peaks with Different Fitting Functions	PRO	PRO	PRO	PRO	PRO	
Peak Analyzer: Fit Baseline with Peaks	PRO	PRO	PRO	PRO	PRO	
Peak Analyzer: Peak Fitting	PRO	PRO	PRO	PRO	PRO	
Peak Analyzer: Peak Integration	✓	✓	✓	✓	✓	
Peak Analyzer: Peak Finding	✓	✓	✓	✓	✓	
Peak Analyzer: Baseline Detection and Subtraction	✓	✓	✓	✓	✓	

Curve Fitting	9	8.6	8.5*	8.1	8	7.5
Orthogonal Regression for Implicit Functions	PRO					
Nonlinear Fit with Integral Function	✓	✓				
Calculate Standard Error for Derived Parameter	✓	✓				
Linear Fit with Support for X Error	PRO	PRO				
Surface Fit with Multiple Peaks	PRO	PRO	PRO			
New Fitting Function Builder for Fitting Function Creation	✓	✓	✓			
Rotated 2D Gaussian Function for 2D Surface Fitting	PRO	PRO	PRO	PRO		
Partial Leverage Plot in Multiple Regression	✓	✓	✓	✓	✓	
Improved Residuals Analysis with Additional Residuals Plots	✓	✓	✓	✓	✓	
Improved Find-X/Find-Y Tool for Linear, Polynomial, and Nonlinear Fit	✓	✓	✓	✓	✓	
New Find-Z Tool for Nonlinear Surface/Matrix Fit	PRO	PRO	PRO	PRO	PRO	
Fitting Comparison	PRO	PRO	PRO	PRO	PRO	PRO
Signal Processing	9	8.6	8.5*	8.1	8	7.5
IIR Filter Design	PRO					
2D FFT Filter	PRO	PRO	PRO	PRO		
Signal Envelope, Coherence	PRO	PRO	PRO	PRO		
Signal Decimation to Reduce/Re-sample Data	PRO	PRO	PRO	PRO		
1D FFT, Inverse FFT and 1D FFT Filter	✓	✓	✓	✓	✓	
2D FFT and 2D Inverse FFT	PRO	PRO	PRO	PRO	PRO	
Short-Time Fourier Transform (STFT)	PRO	PRO	PRO	PRO	PRO	
Wavelet Analysis	PRO	PRO	PRO	PRO	PRO	
Hilbert Transform, 2D Correlation	PRO	PRO	PRO	PRO	PRO	
Statistics	9	8.6	8.5*	8.1	8	7.5
More Distance Measures for Hierarchical Cluster Analysis	PRO					
Grubbs Test and Q-test to Detect Outliers	✓					
Multivariate Analysis	PRO	PRO				
More Normality Test Methods: Anderson-Darling, D'Agostino-K Squared, and Chen-Shapiro	✓	PRO				
Survival Analysis: Kaplan-Meier, Cox Proportional Hazard, Log-Rank etc.	PRO	PRO	PRO	PRO	PRO	
Nonparametric Tests: Mann-Whitney Test etc.	PRO	PRO	PRO	PRO	PRO	
Power and Sample Size	PRO	PRO	PRO	PRO	PRO	
One Way ANOVA, Two Way ANOVA	✓	✓	✓	✓	✓	
One Way and Two Way Repeated ANOVA	PRO	PRO	PRO	PRO	PRO	
Hypothesis Testing	✓	✓	✓	✓	✓	
Hypothesis Testing: One Sample and Two Sample Hypothesis Tests for Variance	PRO	PRO	PRO	PRO	PRO	
Correlation Coefficient, Discrete Frequency and ROC Curve	PRO	PRO	PRO	PRO	PRO	
Basic Descriptive Statistics, Normality Test, 1D and 2D Frequency Count	✓	✓	✓	✓	✓	✓

8.5* is for Origin 8.5 and 8.5.1

Product Support

Standard support is available to all registered customers with active maintenance, and to customers evaluating our products. First year of maintenance is included at the time of purchase.

Support is available Monday - Friday by phone, e-mail, and online chat from 8:30 AM to 6:00 PM EST. Extended support hours from 7:30 PM to 4:00 AM EST are available for online chat and e-mail.

Support resources are also available from the OriginLab website, including video tutorials, FAQs, and a product forum. Our forum contains more than 20,000 posts and questions are answered daily by OriginLab staff and other users.

“Origin is an extremely powerful software package and their technical support has been very responsive. As a new Origin user it has reduced my learning curve tremendously. Between the online videos and rapid replies to my e-mails I have been extremely pleased.”

Nigel Clark - NOVA Chemicals

Note: This opinion is a personal opinion and does not imply any statement or endorsement by NOVA Chemicals.

“Great support from the OriginLab team! I quickly reached the correct technical support person, he was able to answer my questions, and he followed-up with an email which included an example project & written explanation. This type of quick, personal support is one of the key reasons I have used Origin for the past 10 years.”

Eric Scharin - Zogenix, Inc.

“We never had such good customer technical support in the past for any software we bought. I just wanted to let you know that your video was so clear and that your feedback was so helpful that we sure are going to update our version of Origin to 9.0.”

Anne-Marie Gagné, Ph.D - Institut Universitaire en Santé Mentale de Québec



Sign up for our e-newsletter to read featured customer stories, technical tips and resources, news about Origin, and to follow us on social media: originlab.com/Newsletter

About OriginLab Corporation

OriginLab is a leading developer of scientific graphing and analysis software. Since 1992, we have sold over 150,000 copies of Origin around the world. Our customer base includes over 130 Fortune Global 500 companies, over 75 government research laboratories and agencies in the US and Canada, and more than 800 universities and colleges worldwide.

Licensing

OriginLab offers many licensing options, including Single-User, Multi-Seat, Research Lab, Teaching, Student, and OEM. Discounted pricing is available for academic and government customers.

Please visit originlab.com/LicensingOptions to learn more.

“Case Western Reserve University distributes Origin to students, faculty and staff via a software download website. Members of the University can download, install and activate Origin at their convenience with no help needed from our technical support staff.

We have found the process of implementing Origin on our download site to be easy and pleasant. The Origin installation software was easy to use and our users find the setup and activation process to be trouble free and straightforward. We couldn't be more pleased with the service and support we received from OriginLab.”

Pete Babic, Data Systems Manager, Case Western Reserve University

Training

Our training programs range from basic training that helps you get started with our products, to advanced training that teaches you how to customize our products to meet your special needs. All training courses are hands-on, providing attendees with the information and expertise to make optimum use of our products.

“Bombardier Flight Test Center Engineering have been using Origin for several years. It has served us well. It is always a pleasure working with the OriginLab Team, whether it's to get assistance with special software coding or to train our new employees. As a customer, you make scheduling and conducting the training for our employees, at our facility, so easy. Your support engineers have delivered excellent instruction and technical assistance. Thank you for providing world class support! ”

Michael Konicki, Section Chief, Electrical Engineering , Bombardier Flight Test Center

Consulting Service

OriginLab provides consulting services to customize and enhance Origin to meet your specific analysis and graphing needs. Our Applications engineers will work with you to design and implement your custom Origin solution.



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