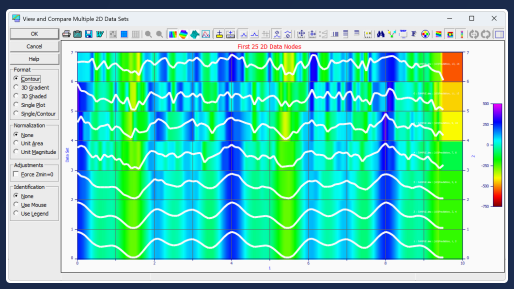
R²N SOFTWARE · TABLECURVE 9

TableCurve 2D

version 9.0



Automated curve fitting and equation discovery

Stop guessing which model fits your data.

A standard TableCurve 2D run fits 3,893 vetted equations to your data and ranks every one, from a catalogue of 4,274. Release 9 adds a 64-bit engine, a 128-bit precision solver, built-in AI guidance and a Python-callable fitting DLL.

TableCurve 2D v9.0

The ninth-generation release: rebuilt 64-bit for Windows 10 and 11, with an expanded equation catalogue, multi-component peak and transition models, and twelve code-generation languages.

SAVE WEEKS OF TEDIOUS DATA ANALYSIS CHORES

Find the ideal model without trial and error

Many researchers spend hours, sometimes weeks, finding a model that describes their data, because conventional tools make them nominate one equation at a time and test it by hand. TableCurve 2D was the first program to automate that search. In a single run it fits 3,893 vetted equations from every discipline against your data and ranks them by the goodness-of-fit criterion you choose. Enable the multi-component models and the run extends to 4,235. Work that once took days of trial and error takes minutes, and every candidate you did not think of has still been tested.

Solve complex science and engineering problems faster…

- Optimize product and process performance

- Quickly calibrate sensors
- Understand complex chemical kinetics
- Reduce empirical data to a simple equation
- Stabilize systems with dynamic feedback
- Perform any general curve-fitting application

Powerful and yet easy to use

Once the fit is complete, TableCurve 2D presents you with a statistically ranked list of candidate equations. You are given all of the information you need to choose the equation that best meets your requirements for the ideal fit. Once you have selected your best-fit equation, output high-quality function code, or generate professional reports with publication-quality graphs. Users consistently comment that, out of the box and without reading the instructions, TableCurve 2D is intuitive and quick to learn.

3,893

equations fitted and ranked in a standard run; 4,235 with multi-component models

38 digits

of precision in the 128-bit solver, for high-order polynomials and rationals

12 languages

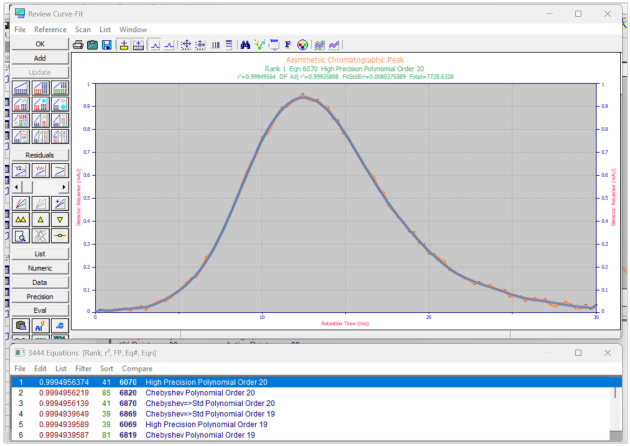
for generated function code, including Python, R, MATLAB and C++

EQUATION DISCOVERY

Quickly find the best equations that describe your data

TableCurve 2D gives engineers and researchers the power to find the ideal model for even the most complex data by putting thousands of equations at their fingertips. TableCurve 2D's built-in library includes a wide array of linear and nonlinear models for any application including equations that may never have been considered — from simple linear equations to high order Chebyshev polynomials. TableCurve 2D is the automatic choice for curve-fitting and data modeling for critical research.

Version 9 raises the catalogue to **4,274 built-in equations**: 3,491 linear models and 783 nonlinear models, every one of them numbered, searchable and available for code generation.



Every fit is ranked: here 3,444 equations fitted to an asymmetric chromatographic peak. Sort by r^2, DOF-adjusted r^2, fit standard error, the F-statistic or equation number, and the graph follows your selection as you scroll.

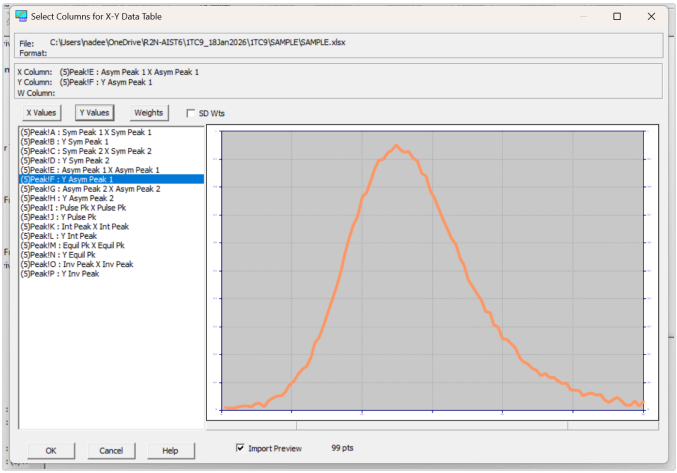
State-of-the-art fitting not found in other packages

- A **128-bit extended-precision solver** (38 significant digits) for properly fitting high order polynomials and rationals that collapse into noise at ordinary double precision.
- **Robust nonlinear fitting** by least absolute deviation, Lorentzian or Pearson VII limit minimization. Each is the maximum-likelihood fit for a heavy-tailed error distribution, so outliers pull the fit far less than they do under ordinary least squares.
- An AI Expert option that automatically selects the appropriate peak, transition or kinetics models for you.
- **Two- and three-component models** — 381 in the catalogue, 342 of them fitted automatically, for data that resolves into more than one underlying component.
- **Built-in AI guidance** that hands your fitted equation, its statistics and its residual pattern to Claude, so the advice you get is about your data rather than about curve fitting in general.

Automation takes trial and error out of curve fitting

Fit all of TableCurve 2D's built-in equations or just the ones you need, with no programming and no setup. Preview the data on import, then start the automated fit with a single mouse click. You can even set up TableCurve 2D to begin fitting the moment data are imported or modified, with Background Thread Processing Fitting.

A standard run fits **3,893 single-component equations**. Enable *All Equations plus Multiple Components* and the run extends to **4,235 equations**, adding the two- and three-component peak and transition models wherever the data's signal-to-noise ratio supports them.



Choose the X, Y and weight columns from a worksheet and preview the data before it is imported. All equations are then available from the grouped toolbars or the Process menu: fit everything, a group of equations, or a custom equation set.

Fit user defined equations

Up to 15 user-defined equations can be entered and ranked along with the built-in equations. These specialized models can contain most mathematical constructs, including special functions, series convergence and conditional statements, differentiations, integrations, and parameter constraints. And, unlike most curve fitting programs, TableCurve 2D's user-defined functions are compiled so custom curve fitting can be performed quickly — at nearly the speed as with the built-in equations. Each user function supports up to 10 adjustable parameters, and functions can be saved individually or collected into libraries.

Accurately extrapolate any data set

Increase the accuracy of your predictions with state-of-the-art AR (Autoregressive) procedures that offer the means to effectively extrapolate any data set. Select from any one of the 9 different procedures for extrapolating your data — 3 to predict ahead, 3 to predict earlier data, and 3 that predict in both directions. Of these algorithms, six offer in-situ noise removal using advanced SVD and Eigendecomposition methods. TableCurve 2D's autoregressive procedures reduce the susceptibility to noise, thereby making your prediction more reliable.

RELEASE 9

What's new in TableCurve 2D 9.0

A 64-bit engine

The entire program has been rebuilt as a native 64-bit application for Windows 10 and 11. The fitting engine, solver and code generator are compiled for x64, graphs render against the modern Windows display stack, and the program runs without compatibility shims on current hardware.

128-bit precision solver

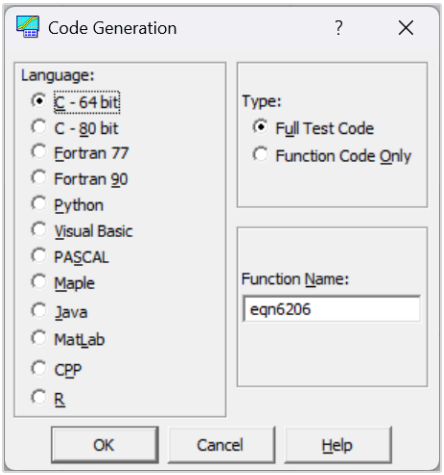
The extended-precision math engine that TableCurve has always used for high-order polynomials and rationals is now a 128-bit implementation carrying 38 significant digits, rewritten in portable C for 64-bit targets. Ill-conditioned fits that degenerate into noise at double precision resolve cleanly instead of failing quietly.

AI guidance built in

Ask the program about the fit in front of you. TableCurve 2D packages the selected equation, its coefficients, its full statistical summary and its residual pattern and hands them to Claude, so the answer concerns your data and your model rather than curve fitting in the abstract.

Two- and three-component models

381 multi-component peak and transition models join the catalogue — Gaussian, Lorentzian, log-normal, extreme value, logistic, Erfc, pulse, LDR, Laplace, EMG, GMG, Voigt, LogNorm4, Gamma and Student families among them. 342 are fitted



Twelve code-generation languages, with Python, R, Maple, Java, MATLAB and C++ new in release 9. Export function code alone or function code with a full test routine.

Six more code-generation languages

Release 9 adds **Python**, **R**, **Maple**, **Java**, **MATLAB** and **C++** to the existing Fortran 77, Fortran 90, C (64-bit and 80-bit), Visual Basic and Pascal targets. Code generation is available for every built-in equation and for the autoregression procedures.

Grouped toolbars

The toolbars are organised by task with a caption printed under each group, so a hundred icons read as named sets rather than an undifferentiated strip. Finding the verb you want no longer means hovering for tooltips.

automatically, gated on the data showing enough signal-to-noise to justify resolving the components.

A project tree that remembers

Up to 25 data sets are open at once in a tree-structured explorer, each carrying its own fits, graphs, generated code and processing instructions. The state of the tree is saved across sessions, so you resume where you stopped without re-importing anything.

NEW IN RELEASE 9 · FOR INSTRUMENT MAKERS AND AUTOMATED PIPELINES

Put the TableCurve 2D engine inside your own software

The complete fitting engine ships as a documented DLL with a flat, caller-allocated C API. It loads directly from Python through `ctypes`, with no wrapper to build, and from any language that can call a C function. Your code loads a data set, runs the full equation scan, and reads back the ranked results, fitted parameters and fit vectors, without the user interface ever opening.

Instrument manufacturers

Embed automated curve fitting behind your own acquisition software, so your customers get a fitted model with every measurement.

Automated pipelines

Fit thousands of data sets from a script, a LIMS or a QC line, using the same engine and the same ranking as the desktop program.

Research code

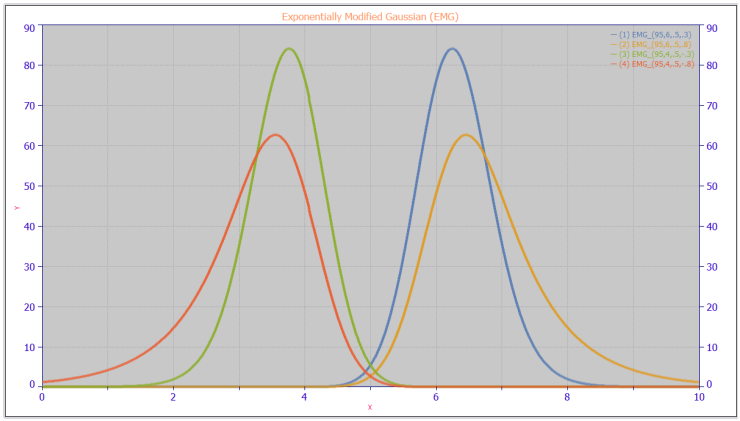
Call TableCurve from Python alongside NumPy and pandas, and keep the equation discovery inside a reproducible notebook or workflow.

REVIEW, COMPARE, OUTPUT

All the tools you need to discover your ideal model

Graphically review curve fit results

Once your XY data have been fit, TableCurve 2D automatically sorts and plots the fitted equations by the statistical criterion you select (r^2, DOF adjusted r^2, fit standard error, maximum error, or the F statistic). Graphically review the fitted results as you scroll through the equation list. Graphically review up to four references in a given curve-fit plot to determine your best model. Compare results with other equations in the current fit or equations saved to disk from prior fits. Graph the residuals in one of five different formats or add confidence



Plot several fitted functions on one graph to compare them directly — here four members of the exponentially modified Gaussian family, two leading and two tailing, drawn from the built-in peak library.

and prediction intervals to the graph to detect outliers in your data. Plot derivatives, cumulative area, or residuals on a second Y-axis.

Compare models using meaningful numeric information

Data, statistical and precision summaries are available so you can further analyze fit results. These summaries can be simultaneously displayed and are automatically updated when a different equation is selected for review. The evaluation option with automated table generation includes function, derivatives, roots and cumulative area.

Effectively manage complex data sets

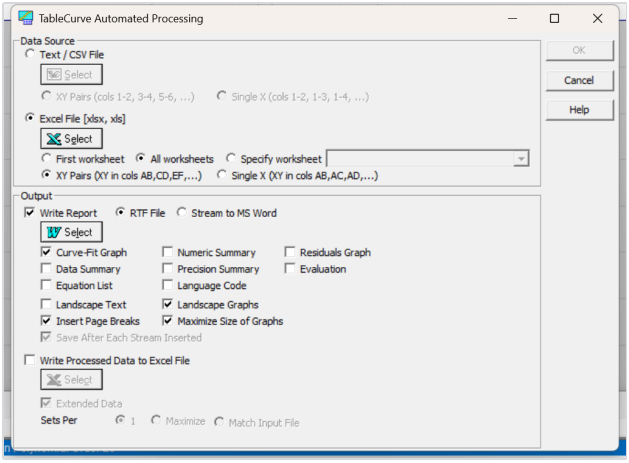
TableCurve 2D offers state-of-the-art smoothing and denoising techniques to remove the noise in your data. Select from a total of 6 smoothing/denoising algorithms. Of special importance is Eigendecomposition Denoising, a non-parametric procedure where separation is based on signal strength. For Fourier Denoising, TableCurve 2D offers a data taper to minimize spectral leakage and the means to filter either by the magnitude of FFT channels or by frequency threshold. Inspect analytic derivatives for all built-in equations, as well as all of the smoothing procedures. Mask outliers and refit your data in a single step.

Precisely model exotic data sets

For those rare data sets that cannot be adequately managed by a parametric model, TableCurve 2D offers five non-parametric estimation and interpolation procedures. All offer true state-of-the-art algorithms. For example, there are eight different spline procedures, including two least-squares minimizations, non-uniform rational B-splines (NURBS) and a least-squares spline with user-defined knots. TableCurve 2D also includes smoothing spline, local regression, and Fourier interpolation procedures.

Flexible output options

Preview your graph and output publication-quality graphs in several different formats. Produce files containing data and equations in Excel, ASCII and SigmaPlot formats, and professional reports with graphs and tables. TableCurve 2D also generates function code and test routines for every fitted equation in twelve languages.



Point the automation at a workbook of XY pairs, choose what goes into the report, and every data set is fitted and documented unattended.

Maximize your productivity with automation

Batch processing fits large numbers of data sets unattended, with no programming. Denoise a hundred data sets in one step, fit them to a target equation in a second, and collect the results: graphs and numeric summaries go to an MS Word (or generic RTF) report and numeric data to MS Excel. Automation is available for all of TableCurve 2D's major procedures.

APPLICATIONS

Equations for every application

Optimize process control...

Quite often, substantial cost savings can be realized by optimizing process control parameters. Since TableCurve 2D automatically reports the minima and maxima of both fitted functions and derivatives, process optimization is often a simple matter of using a single number within the report.

Fit tabulated data...

Frequently, engineers and scientists need to convert tables of data found in handbooks or journals into a simple equation, often for use in software or microcode. TableCurve 2D is capable of producing equations that preserve all or most of the accuracy present within the tabulated data. TableCurve 2D even furnishes a Precision Summary for instrument designers who must use fixed point math in their microprocessors.

Produce equations for complex modeling or monte-carlo simulations...

TableCurve 2D can be used to convert empirical data from hundreds of sources into simplified equations. These equations can then be input into complex models or Monte-Carlo simulations to simulate the effects of hundreds or even thousands of variables upon a given model.

Generate calibration curves...

TableCurve 2D excels for applications in calibration science. Whether you need to calibrate a flow meter, wind tunnel measurements or satellite instrumentation signals, TableCurve 2D can furnish the ideal parametric model.

Create black box models...

At times, an engineer or scientist wants to study a highly complex process, such as human biochemistry, where underlying models are poorly defined. For such instances, TableCurve 2D can provide important insights into the subtle mechanisms in play. A successful model may suggest further experiments in pharmacokinetics, high energy physics or crystal chemistry.

Resolve overlapping components...

Where a measured trace is the sum of more than one underlying process, the two- and three-component peak and transition models recover the components directly, with each component's parameters and confidence limits reported separately.

Or simply interpolate data...

There is no simpler, faster or more automated way to interpolate data than with TableCurve 2D. Data tables or individual interpolated points are effortlessly generated for even the most demanding data sets.

USED IN PUBLISHED RESEARCH

TableCurve 2D in the literature

A selection of peer-reviewed studies that report fitting their data with TableCurve.

Ovarian volume throughout life: a validated normative model
Kelsey TW et al. *PLOS ONE* 8(9): e71465 (2013)
REPRODUCTIVE MEDICINE · 2D

A model to explain temperature dependent systemic infection of potato plants by Potato virus Y
Choi KS et al. *Plant Pathology Journal* 33(2): 206–211 (2017)
PLANT PATHOLOGY · 2D

Importance of host feeding in the biological control of insect pests: case study of egg parasitoid species
Cabello T et al. *Insects* 15: 496 (2024)
ENTOMOLOGY · 2D

Development modeling of Lucilia sericata (Diptera: Calliphoridae)
Roe A, Higley LG *PeerJ* 3: e803 (2015)
FORENSIC ENTOMOLOGY · 2D

More published applications: r2nsoftware.com/knowledgebase/tablecurve

GET STARTED

Try TableCurve 2D on your own data

Download a free trial from our website, or contact our sales team for pricing, academic and volume licensing, upgrades from earlier versions, and integration of the fitting DLL.

TRIAL r2nsoftware.com/trial-download
SALES sales@r2nsoftware.com
PHONE +1-630-635-5957

SCAN FOR R²N HOME

SPECIFICATIONS

TableCurve 2D 9.0 Features

- New in TableCurve 2D 9.0

INTERFACE

- Native 64-bit application for Windows 10 and 11
- Grouped toolbars with printed group captions
- In-app AI guidance: hands the fit, its statistics and its residuals to Claude
- Tree-structured project explorer, up to 25 data sets open at once
- Project state saved across sessions; resume without re-importing
- Multitasking with background thread curve-fit options
- Advanced online help system
- Drag and drop files for immediate fitting
- Fully customizable 2D graphs
- Smooth bitmap rendering of graphs
- XY meter in graphs displays cursor coordinates

- Global Reset option to undo all changes made to the data table

DATA INPUT

- Native .xlsx worksheet import new
- Up to 65,536 points in data table
- 16.4 million points can be filtered into table using averaging digital import filter
- File types: ASCII, Excel, Lotus, Quattro Pro, SigmaPlot, dBase, DIF, binary
- Graphical XY column selection with import preview
- Weights or standard deviations optionally assigned
- Compare up to five data sets
- Automatically process replicate data sets

DATA MANAGEMENT

- Real-time smoothing with FFT, Loess, Savitzky-Golay, Gaussian Convolution, Eigendecomposition and Kaiser-Bessel time-domain smoothing
- Real-time Fourier domain editing with exact-N FFT; data tapering
- Eigendecomposition filtering to isolate components based on signal strength
- Graphical and numerical sectioning; graphically enable or disable data points
- First and second order analytic derivatives for all built-in equations
- Multiple curve-fit references on a single graph (up to 4 references)
- Apply calculations to X, Y and Weight values
- Spreadsheet-like data editing with optional graphing of data as they are entered

EQUATION DISCOVERY AND CURVE FITTING

- 4,274 built-in equations new
- 3,491 linear equations, of which:
- 105 one-term, $y = a + b \cdot f(x)$ and $f(y) = a + b \cdot f(x)$
- 630 two-term mixed basis function linear
- 1,330 three-term mixed basis function linear
- 1,140 four-term mixed basis function linear
- 137 polynomials in 13 families, including Chebyshev, high-precision, Fourier-series, even order and half order
- 149 rationals in 14 families, including Chebyshev, high-precision, Fourier-series and iteratively refined sets
- 783 nonlinear built-in models new
- 402 single-component peak, transition, kinetic, waveform, power and robust-line models
- 381 two- and three-component peak and transition models, 342 fitted automatically new
- Multi-component fitting gated on measured signal-to-noise (35 dB or better) new

FIT CONTROL AND PRECISION

- High-precision polynomials and rationals fitted to 38 significant digits
- 128-bit extended-precision solver, portable C implementation new
- Up to 21 fitted parameters per equation
- Fit All Equations fits 3,893 single-component models; All Equations plus Multiple Components fits 4,235 new
- Rapid searching, sorting and filtering of equations
- User customizable equation sets
- Full control of fit process, including goodness of fit criteria, matrix methods, minimization, and other options
- AI Expert for automatic selection of peak, transition or kinetic models to be fitted
- Robust straight-line fit option
- Three robust fitting methods available for all non-linear equations and user functions
- Levenberg-Marquardt nonlinear optimization; singular value decomposition for constrained and ill-conditioned systems

PREDICTION METHODS

- State-of-the-art autoregressive procedures for forward and backward predictions and extrapolations
- 9 different procedures — 3 to predict ahead, 3 to predict earlier data, and 3 that predict in both directions
- In-situ noise removal using advanced SVD and Eigendecomposition methods
- View complex roots, order selection criteria, singular values, residuals and numeric summaries
- AR filter code generation supported in all twelve languages, plus export filter to disk new

USER-DEFINED FUNCTIONS (UDFS)

- UDF editor with push button help for inserting functions
- UDFs automatically compiled for speed
- Up to 15 UDFs can be fit at one time, each with up to 10 adjustable parameters
- Graphical UDF adjustment procedure for refining starting estimates
- UDFs can be saved as libraries

- Expression parser with more than 200 mathematical, statistical and special functions
- Series convergence, conditional statements, differentiation, integration and parameter constraints

ESTIMATION AND INTERPOLATION

- Eight spline procedures, 3 interpolation and 5 smoothing, including NURBS and least-squares B-splines with fixed, optimized, or user-specified knots
- Six procedures for spline estimation of smoothed data; 1st and 2nd derivatives
- Local regression spline estimation; 1st and 2nd derivatives
- Savitzky-Golay spline estimation; accurate derivatives orders 1-8; filter coefficients
- Fourier Interpolation; derivatives orders 1-4
- Directly specify and plot output for all Estimation procedures

CURVE-FIT ANALYSIS AND OUTPUT

Numerical

- Evaluation option with automated table generation, includes function, derivatives, roots and cumulative area; save evaluations to disk; evaluations are automatically updated whenever an equation or algorithm setting changes
- Full numeric and statistical summary, including coefficients, standard error, confidence limits, ANOVA, goodness of fit, measured function and derivative, minima and maxima, maximum error, and poles reported for rational functions
- Data summary with predicted values, residuals and confidence/prediction limits
- Precision summary and term significance analysis across 17 precision levels
- Sort equations by r^2, DOF Adjusted r^2, Std Error, F-statistic, floating point speed, equation number and maximum error; arrange by parameter count

Graphical

- Curve-fit graph with zoom-out, customizable layout, labels, grids, scaling, points, font, titles and resolution
- Confidence/prediction intervals (90, 95, 99, 99.9 and 99.99 percent)
- Error bars for replicate-based data
- Residuals graphs, separate or on the Y2 axis of the curve-fit graph, including bar graphs, histogram, and stabilized normal probability plot for assuring normality of residuals
- View and compare multiple data sets as stacked traces, contour fields, 3D gradient or shaded plots new
- Copy numerical data for any graph to clipboard as a spreadsheet block
- Exclude and Refit enables disabling of outliers and immediate refitting during equation inspection

CODE GENERATION

- Twelve target languages new
- C (64-bit), C (80-bit), Fortran 77, Fortran 90, Visual Basic, Pascal
- Python, R, Maple, Java, MATLAB, C++ new
- Function code or function code with full test routines
- Available for all built-in equations and autoregression procedures

OUTPUT AND EXPORT

- Publication quality printed graphs with full print preview
- Image formats include bitmaps, metafiles, enhanced metafiles and device-independent bitmaps
- File formats include ASCII, Excel .xlsx, Excel .xls and SigmaPlot new
- Professional reports with MS Word or RTF export that includes graphs and numeric results; available for all major procedures
- Graphs can be half or full page, landscape or portrait mode all in a single document

INTEGRATED AUTOMATION

- Batch processing for automatically processing large numbers of data sets unattended; available for all major procedures
- Multiple data sets in an Excel spreadsheet processed with the ease of a single data set
- Stream reports directly to MS Word or RTF format
- Documented DLL with a flat, caller-allocated API new
- Loads directly from Python via ctypes — load data, run a scan, read back ranked results, parameters and fit vectors new
- Professional automation interface for instrument manufacturers

SYSTEM REQUIREMENTS

- Windows 10 or Windows 11, 64-bit new
- x64 processor new
- 4 GB RAM minimum; 8 GB or more recommended for large data sets and automation
- 250 MB of available disk space
- 1920 × 1080 display or higher recommended
- Internet connection required for licence activation and AI guidance