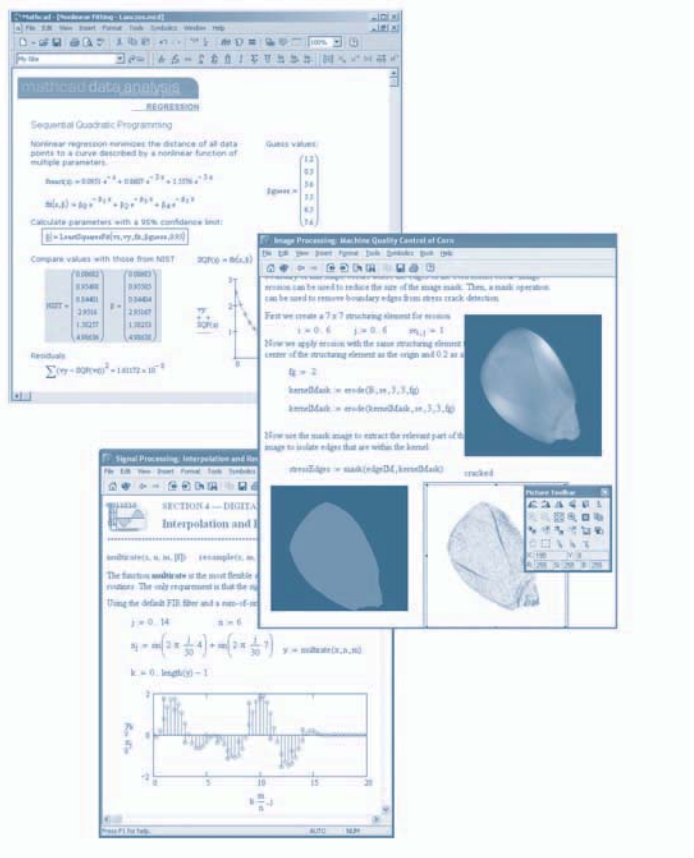
Mathcad® Extension Packs

Boost the calculation power of Mathcad

Mathcad Extension Packs add valuable functionality to your engineering calculation environment, so you can incorporate your data analysis, image processing, signal processing, and wavelets work with publication quality technical documents created in Mathcad. Combined with your Mathcad desktop solution, these extension packs add substantial calculation depth and breadth, along with the same superior ease-of-use, flexibility and extensibility of Mathcad.

Extend the power of your Mathcad solution with one or more of the following options:

- Mathcad Data Analysis Extension Pack – Analyze engineering data patterns and relationships using this powerful extension pack.
- Mathcad Image Processing Extension Pack – Solve realistic image-processing problems using a broad range of advanced image filtering and manipulation functions.
- Mathcad Signal Processing Extension Pack – Perform analog and digital signal processing, analysis, and visualization to ensure optimal product performance.
- Mathcad Wavelets Extension Pack – Apply sophisticated wavelets techniques to your signal and image analysis for greater accuracy and clarity in results.



The power of Mathcad can easily be extended with capabilities such as image processing, signal processing, and advanced data analysis.

Key Benefits

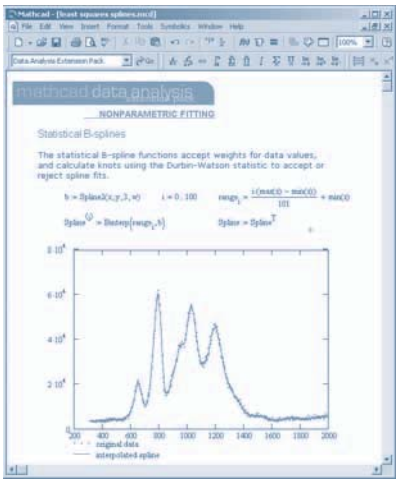
- Easily extend your calculation capabilities and resources in Mathcad
- Leverage new and advanced techniques to manage and analyze data effectively in Mathcad
- Enable a broader range of iterative design explorations, investigative analysis, and what-if scenarios
- Increase accuracy and clarity of results

Mathcad Data Analysis Extension Pack

Add the latest data analysis technology in fitting algorithms for quicker, more robust, more accurate solutions. Designed with industrial applications in mind, the Mathcad Data Analysis Extension Pack delivers a powerful design solution for analyzing data patterns and relationships. It appeals to a broad base of professionals from engineers to statisticians to physicists to business analysts, all of whom rely on analyses of data in their field of work.

The Data Analysis Extension Pack expands Mathcad capabilities in the following areas:

- Utilities: New functions and components that help you import and manipulate raw data matrices.
- Statistics: Functions that calculate statistical quantities for vectors and matrices of data.
- Outliers: Functions that detect, mark, and eliminate outliers from data for subsequent processing.
- Regression: Functions that perform parametric fits to data, or return information on the quality of fit.
- Splines: Functions that interpolate between data points.



New least-squares B-splines offer optimal compression of data while retaining all significant features of the dataset.

Key Capabilities

- Robust data-handling capabilities. Handle data from many different systems in many formats:
  - Multiple, large datasets with inconsistent column formatting and labeling/headers
  - Data of very small or very large scale
  - Data with hundreds of measurements that must be reduced to a more compact representation
  - Data with missing measurements or suspected outliers
  - Evaluate data visually and qualitatively to determine the best course of analysis (EDA)
- Data Import wizard component allows you to read files in ASCII, fixed-width, binary, Microsoft Excel®, and other formats, preview contents, visually select rows and columns for import, choose fillers for missing values, and specify delimiters
- Matrix utility functions for flexible table lookup, data ranking, and empirical maxima and minima searches
- Statistical functions for EDA, outlier detection, and missing value NaN (not a number) support
- Flexible nonparametric fitting algorithms (interpolation) using statistical methods to create optimal solutions, and returning more information about the fit
- Robust, generalized parametric nonlinear fitting functions that support weighting and constraints
- Principal Component Analysis (PCA) functions for multivariate data using the Nipals algorithm
- Probability plots, including normal and Weibull plots.
- Confidence limits, and demonstration of ANOVA for fitted parameters
- Documentation that includes examples of commonly used analysis scenarios with real data, written in Mathcad for easy reuse
- Detailed documentation of existing Mathcad functions for data analysis, in conjunction with Mathcad programs and Scriptable components, presents new ways to use the already powerful toolset in Mathcad

Mathcad Image Processing Extension Pack

With its extensive image processing, analysis and visualization capabilities, the Mathcad Image Processing Extension Pack is ideal for research scientists and engineers, design engineers, system analysts and image specialists working on imaging applications across many industries, including defense, photography, medicine, manufacturing, law enforcement and multimedia. It is also a valuable tool for students studying electrical engineering or computer sciences. This robust Mathcad add-on tool provides more than 140 built-in image processing functions, including capabilities for filtering, morphology, edge detection, segmentation and feature extraction. Along with this added imaging power, you get Mathcad's regular image viewer, matrix operations, FFTs and numerics on your desktop to help you fully analyze images.

The Image Processing Extension Pack also offers expanded electronic documentation with templates and application examples.

Key Capabilities

- Image analysis and transforms
- Image enhancement and restoration
- Geometric transforms
- Binary image operations
- Extraction of statistical information
- Color space conversions
- Image type conversions
- Pseudo-color imaging
- Convolution and filtering
- Morphology–to achieve sharper image characterizations for object identification
- Edge Detection–image enhancement for object identification
- Segmentation–for analyzing specific regions/clusters of interest
- Feature Extraction–to identify and quantify object features
- Complete demonstrations of the image viewer, with interactive image manipulation capabilities
- Many supported file formats, including BMP, GIF, JPG, PCX, TARGA, PGM, TIFF
- E-book documentation and application files

Mathcad Signal Processing Extension Pack

With its extensive signal processing, analysis and visualization capabilities, the Mathcad Signal Processing Extension Pack is ideal for electrical design, DSP, audio, recording and research engineers, as well as other engineers and scientists involved in a broad range of signal processing applications, in industries such as telecommunications, test and instrumentation, manufacturing, defense, control systems, geophysics, electronics, and medicine, among others.

This powerful Mathcad add-on tool provides a total of over 70 built-in signal processing functions, including functionality in signal filtering, spectral analysis, time-frequency analysis, and spectral estimation. In addition, you get full support for multi-channel and complex signals, and a full suite of filtering windows.

Key Capabilities

- Analog and Digital Signals and System Analysis
- Convolution and Correlation
- FFT and IFFT Fast Fourier Transforms and Inverses
- FIR and IRR Filter Design
- Hartley, Walsh and Hilbert Transforms
- Joint time-frequency Analysis
- Lowpass filtering
- Signal filtering
  - Filtfilt function
  - Multirate function
  - Median filtering
- Spectral analysis
- Real and complex cepstrum
- Signal windowing functions
- MUSIC method for spectrum estimation
- Time frequency analysis
  - Short-time Fourier transform
  - Common BTFRs
- Time-dependent autocorrelation
- Time series analysis

Mathcad Wavelets Extension Pack

The Mathcad Wavelets Extension Pack lets you take a new approach to signal and image analysis, time series analysis, statistical signal estimation, data compression analysis and special numerical methods. Create an almost limitless number of functions that duplicate any natural or abstract environment.

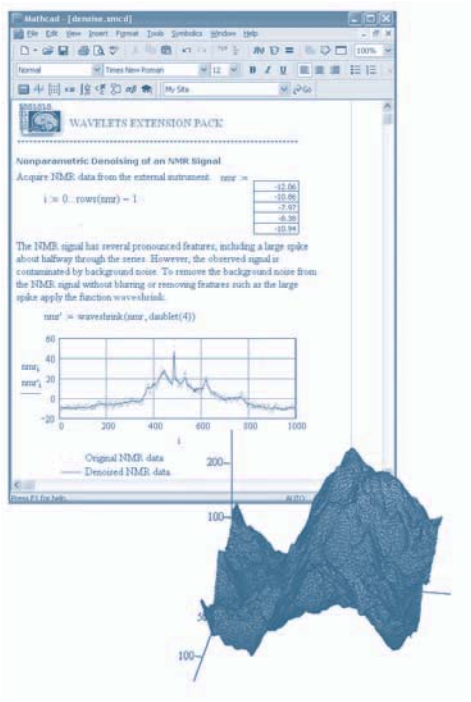
Wavelet analysis results in greater accuracy and clarity for efficiently portraying signals and images with discontinuities for which FFTs are ill-suited. Wavelets analyses use approximating functions that are localized in time, so they are very useful for signals that change over time. Wavelets separate a signal into multi-resolution components, capturing both fine and course scale features.

Wavelet analysis is applied in signal processing, medical imaging, pattern recognition, de-noising, data compression, and numerical analysis.

The Mathcad Wavelets Extension Pack provides extensive functionality supporting both basic and advanced applications. It integrates over 90 key wavelets functions, including one- and two-dimensional wavelets, discrete wavelet transforms, multi-resolution analysis and more. Extended coverage includes Orthogonal and Biorthogonal wavelet families, including Haar, Daubelts, Symmlets, Coiflets and Bspline.

Key Capabilities

- One-Dimensional (1D) Wavelets: Creating 1D Wavelets; Discrete Wavelet Transforms; The 1D Wavelet Approximation; Multi-resolution Analysis
- Two-Dimensional (2D) Wavelets: Creating 2D Wavelets; Discrete Wavelet Transforms; The 2D Wavelet Approximation; Multi-resolution Analysis
- Wavelet Packet Analysis: Wavelet Packet Transforms; Wavelet Packet Bases; The Best Basis Algorithm; Inverse Wavelet Packet Transforms
- Local Cosine Analysis: Discrete Cosine Transforms; Local Cosine Transforms; Tapers for Local Cosine Analysis
- Reference Files: Available Functions: Wavelet Filters; User-Defined Wavelet Filters; One-Dimensional Wavelet Interpolation; Two-Dimensional Wavelet Interpolation; Function Evaluation on Basis; Function Evaluation on Tables; Subband Insertion; Subband Extraction
- Appendices: Wavelet Families; Test Signals and Other Useful Functions; Additional Wavelet Functions; Bibliography



The Wavelets Extension Pack lets you view and explore details in data or signals that other techniques miss, destroy or lose. In addition, integration with Mathcad's OpenGL® graphing capabilities offers superior visualization power.

Language Support

Extension Packs are available in English only.

System Requirements

- Mathcad
- Windows® XP 2000 or higher
- At least 5 MB free hard disk space (7MB for Mathcad Wavelets Extension Pack)
- CD-ROM drive

For More Information

For more information on Mathcad and the Mathcad Extension Packs, visit www.ptc.com/go/mathcad