Mathcad®

Create and Document Critical Engineering Calculations

More than 250,000 professionals worldwide are using Mathcad to perform, document, and share calculation and design work. The unique Mathcad visual format and easy-to-use whiteboard interface integrate standard mathematical notation, text, and graphs into a single worksheet–making Mathcad ideal for knowledge capture, calculation reuse, and engineering collaboration. Mathcad lets individuals work with update-able, interactive designs, so users can capture the critical methods and values behind each of their engineering projects.

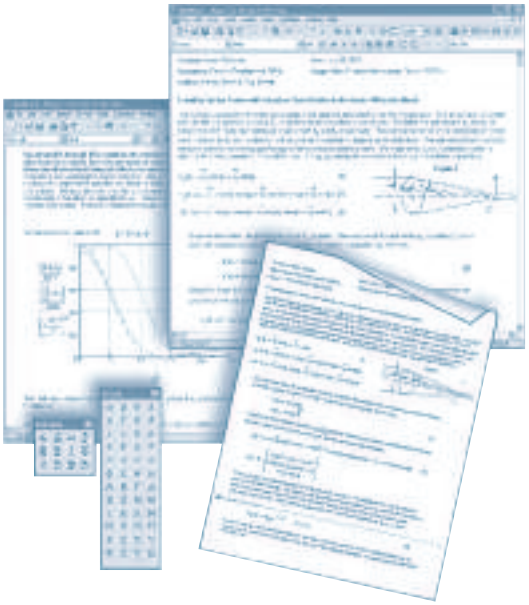
Mathcad's XML architecture enables organizations to go beyond powerful calculation. It delivers an open-engineering data model, enabling publishing, collaboration, and integration, especially when deployed as an organizational standard. As engineers work, Mathcad automatically creates an auditable trail of documented calculations thus simplifying compliance, reporting, verification, and troubleshooting.

These capabilities have made Mathcad the world's most widely used engineering calculation tool.

How Mathcad Works

Mathcad lets you type equations just as you would write them on a blackboard or in a reference book. There is no difficult syntax to learn; you simply type in your equations, and then see the results. You can use Mathcad equations to solve just about any math problem you can think of, symbolically or numerically. You can place text anywhere on the worksheet to document your work.

Mathcad lets you easily mix and convert between unit systems, catching unit mistakes by checking your worksheets for dimensional consistency. You can work in your preferred unit system, or switch to another system for a particular set of equations.



Mathcad lets you create engineering documents that clearly communicate technical work, and adhere to strict standards.

Mathcad simplifies and streamlines documentation, critical to communicating and to meeting business and quality assurance standards. By combining equations, text, and graphics in a single worksheet, Mathcad makes it easy to keep track of the most complex calculations.

"With the capabilities of Mathcad, a designer can improve productivity and enhance analysis capability with minimum effort."

- Alan Victor, IBM, Applied Microwave & Wireless

Key Features and Benefits

- Calculate, model, and visualize your technical ideas while reducing errors
- Update interactive designs for instant results
- Document your calculations using unit-aware math notation
- Graph and plot your work instantly with built-in 2D and 3D graphing tools
- Verify, visualize, and annotate your solutions for all engineering disciplines
- Integrate your data across applications and systems
- Publish your results using a wide variety of output formats
- Reduce errors in your work with automatic unit checking
- Set your own default unit system and create your own units
- Automate your operations with templates and stylesheets
- Import and export data easily
- Integrate with Pro/ENGINEER® to realize unique predictive engineering capabilities

Computational Capabilities

- High-end numerics: Perform summations, products, derivatives, integrals, and Boolean operations; apply trigonometric, exponential, hyperbolic, and other functions and transforms.
- Live symbolics: Simplify, differentiate, integrate, and transform expressions algebraically; Mathcad's patented live symbolics technology automatically recalculates algebraic solutions and allows you to use them in subsequent calculations.
- Vector and matrix handling: Manipulate arrays and perform various linear algebra operations, such as finding eigenvalues and eigenvectors.
- Statistics and data analysis: Generate random numbers, calculate histograms, fit data to built-in and general functions, interpolate data, and build probability distribution models.
- Differential equation solving: Solve ordinary and partial differential equations, systems of differential equations, and boundary value problems, both at the command line and in solve blocks that use natural notation to specify the differential equations and constraints.
- Units support: Include units in calculations, perform unit conversions and automatically check dimensions. Add domain specific units. Convert results to any unit system or custom values.

Feature Details

- Math formats and display:
  - Real, imaginary, and complex number support
  - Decimal, binary, octal, and hexadecimal formats
  - Over 200 built-in units with user-defined default options
  - Support for creating user-defined unit systems
  - Engineering and scientific notation display
  - Mixed integer display
  - Explicit calculations enable variables to be displayed in the equations as defined values, improving visual audit and review of calculations
- Live math and symbolics capabilities:
  - Define and evaluate variables and functions numerically or symbolically
  - Manipulate, transform, and extract information from matrices
  - Expand, factor, and simplify expressions algebraically
- Built-in operators:
  - More than 17 arithmetic operators, 12 vector and matrix operators, and 5 summation and product operators
  - 2 derivative operators and 5 integration and limit operators
  - 9 evaluation operators
  - 10 Boolean operators
  - Customized, user-defined operator support
  - Arithmetic operations are IEEE-adherent
- Graphing and visualization:
  - Standard engineering plot-types: x-y plots, a secondary y-axis, polar plots, bar charts, vector, contour, scatter, and surface plots
  - 2D and 3D QuickPlot™ and plot annotation capabilities
  - Interactive plot zoom data point selection, and 3D angle adjustment
  - Detailed plot formatting for numbers, ticks, labels, line types, markers, etc.
  - Image viewer with support for BMP, GIF, JPG, PCX, TARGA, PGM, TIFF
  - Image manipulation (zoom/pan/crop, brightness/contrast, rotate/flip/transpose, etc.)

- Built-in functions:
  - 80+ core mathematical functions and 10 discrete transform functions
  - 110+ statistics, probability, and data analysis functions
  - 18 differential equation and partial differential equation solvers
  - 28 file access functions
  - 14 expression-type and string functions
  - 18 finance functions
  - 13 symbolic functions, including numer and denom, for algebraic calculations
- Application customization and extensibility:
  - Native XML file format for simple integration
  - Ability to add user-created functions created in C or C++
  - Embed, link, and automate any OLE-compliant application or ActiveX control in Mathcad using VBScript™ or JScript™
  - Use OLE Automation & Visual Basic® to develop solutions incorporating Mathcad computations
  - New Software development kit (SDK) for building custom C++ components for integrating with third-party applications inside Mathcad
  - Support for setting user's own function libraries
- Solving capabilities:
  - 7 built-in functions for system solving and root-finding
  - 18 built-in functions for solving ordinary differential equations and partial differential equations
  - Solve block notation for solving systems of linear, nonlinear, and differential equations in natural notation, along with constraints
  - Programming and parameterization for repeated solutions
- Document/text editing features:
  - Customizable spell checker with technical terms database
  - Document templates and stylesheets
  - Hyperlinking
  - Hide, collapse, and password lock
  - Support for UNICODE
  - Right-click menu for inserting math regions into text regions
  - Drag-select a series of regions simultaneously
- Usability features:
  - Automatic recalculation
  - Easy-to-use equation editor
  - Error tracing and redefinition warnings
  - Multi-step undo
  - Flexible data import features, supporting text and numerical entries, engineering format, real and complex data, cut and paste, and import from a wide variety of file formats (Excel, fixed width, binary, etc.)
  - Enhanced error messages clarify source of problems
  - Program debugging capabilities
  - Comprehensive units support
  - Autosave function
- File formats, publishing, and Web support:
  - Save as HTML, XHTML, and RTF formats
  - Can be converted to Adobe Acrobat® PDF
  - HTTP file open support
  - Publish worksheets to the Mathcad Calculation Server
- Data exchange features:
  - Native XML file format for simple data exchange
  - Data Import Wizard
  - Data import for .mat files, Excel files, Lotus 1-2-3, ASCII, binary, and others
  - Microsoft® Access, FoxPro, and SQL-supported databases as well as ODBC connectivity
  - Enhanced Excel data exchange and integration
- Integration with Pro/ENGINEER
  - Bidirectional integration enables efficient and accurate data exchange between applications
  - Supports dynamic, live updates to calculations and CAD models
  - Values or results of calculations performed in Mathcad drive parameters and dimensions in the CAD model
  - CAD parameters and dimensions can be sent to Mathcad as inputs to calculations

- Connectivity with other applications, including:
  - Microsoft® Excel and PowerPoint
  - MathWorks MATLAB®
  - National Instruments® LabVIEW™
  - Bentley Microstation®
  - ANSYS® Workbench™
- Resources:
  - References tables, key formulas, and constants
  - Technical support knowledgebase
  - Detailed tutorials across all Mathcad functionality
  - Easy-to-use online help with Search and Index
  - More than 300 QuickSheets for standard analyses and tasks
  - 11 language dictionaries
  - User forums and Web Library

Specifications

Client Hardware Requirements

- Pentium/Celeron processor, 400 MHz or higher; 700+ MHz recommended
- 256 MB of RAM; 512 MB or more recommended
- 550 MB of hard disk space (250 MB for Mathcad, 100 MB for prerequisites, 200 MB temporary space during installation)
- CD-ROM or DVD drive (for CD installation only)
- SVGA or higher graphics card and monitor
- Mouse or compatible pointing device

Client Software Requirements

- Windows 2000 SP4, Windows XP SP2 or later

Server Requirements for Volume License Deployment

Requirements for Mathcad network installations Macrovision® FLEXlm® requirements (licensing management solution):

- PC with Pentium/Celeron, 300 MHz or higher, 400+ MHz recommended
- Windows 2000 SP4, XP or later
- At least 150 MB of hard disk space
- CD-ROM or DVD drive
- SVGA or higher graphics card and monitor
- Mouse or compatible pointing device

Macrovision® FLEXlm® requirements (software license management for an organization's user base):

- Windows 2000 SP4, XP or later
- 16 MB free memory (for license management process)
- 9 MB of hard disk space (not including log file)
- CD-ROM or DVD drive
- SVGA or higher graphics card and monitor
- Mouse or compatible pointing device

For More Information

For more information on Mathcad, visit www.ptc.com/go/mathcad.