

# PTC Mathcad® Prime® 3.0

The Standard for Engineering Calculations

PTC Mathcad is the industry standard software for solving, analyzing, and sharing your most vital engineering calculations.

PTC Mathcad's live mathematical notation, units intelligence, and powerful calculation capabilities, presented within an easy-to-use interface, allows engineers and design teams to communicate their critical design and engineering knowledge.

PTC Mathcad does what spreadsheets, word processing, presentation software and programming applications simply cannot do – it brings powerful calculation capabilities into human-readable form. It integrates these human-readable, live calculations with plots, graphs, text, and images into a single, interactive, professionally presented document. This ease and familiarity of an engineering notebook enables design exploration, validation and verification, and the clear communication of critical engineering information. You don't need to be a PTC Mathcad expert to read and understand PTC Mathcad documents.

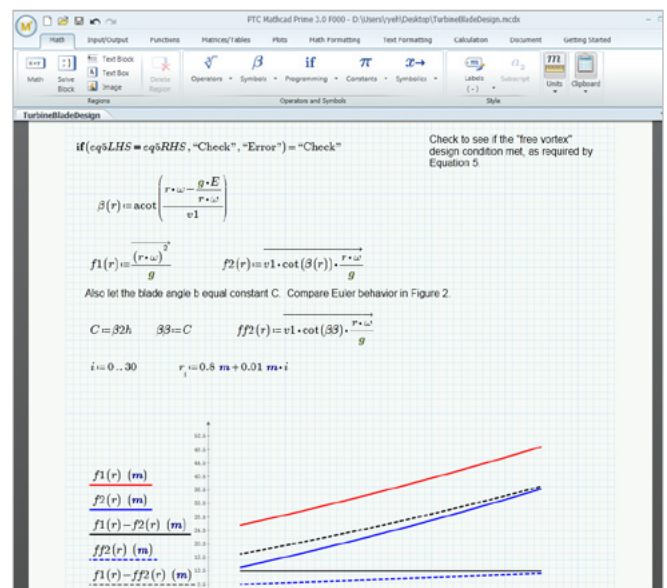
PTC Mathcad Prime 3.0 has significantly improved its calculation capability to allow bigger problems to be solved, faster. With hundreds of built-in mathematical functions and the unlimited ability to define your own, PTC Mathcad supports your advanced engineering design exploration requirements, including the ability to solve equations both numerically and symbolically, and the ability to solve complex systems of equations.

The result is a comprehensive tool allowing every engineer – from the casual user who simply needs to document the source of design parameters, to the power user who needs to perform sophisticated design studies and trade-off analyses – to spend more of their time actually engineering.

## How PTC Mathcad Prime 3.0 works

PTC Mathcad Prime 3.0 lets you type equations just as you would write them on a blackboard or read them in a reference book. There's no difficult programming language or syntax to learn; you simply type in your equations and see the results. You can use the equations to solve virtually any math problem you encounter. And you can place text anywhere on the worksheet to document your work.

PTC Mathcad Prime 3.0 also lets you easily set your preferred unit system and freely mix units of measure, ultimately maintaining dimensional integrity and preventing unit mistakes. You can work in your preferred unit system or switch to another system for a particular set of equations.



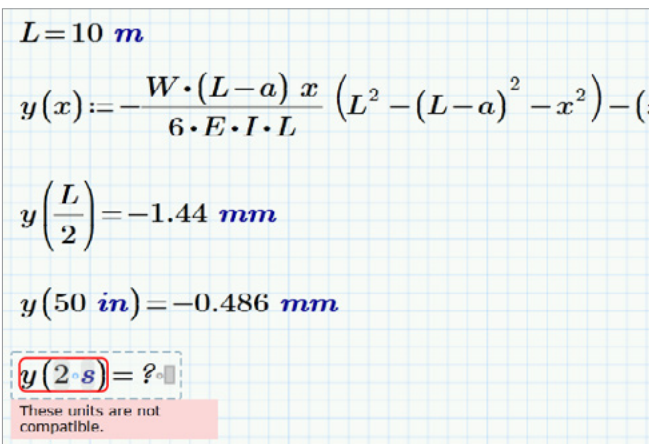
Live mathematical notation, units intelligence, and powerful calculation capabilities, all within an easy-to-use interface.

PTC Mathcad Prime 3.0 simplifies and streamlines calculation documentation, which is critical to optimizing the design process and meeting product requirements and quality assurance standards. It combines equations, text and graphics in a presentable format, making it easy to keep track of the most complex calculations for verification and validation. And when used in conjunction with PTC's Product Lifecycle Management (PLM) software, PTC Windchill®, engineering calculations can be easily managed, standardized and shared across the organization. You do not have to be a PTC Mathcad expert (or even a user) to be able to read and understand calculations in PTC Mathcad documents. This helps expedite knowledge capture, design review processes, and exchange of engineering knowledge.

## Key Capabilities

### Math editing

- Write equations using standard math notation
- Simple equation editor – intuitive and natural entry
- Ribbon and / or keyboard entry
- Use standard operators for algebra, calculus, logic, linear algebra and more



$$L = 10 \text{ m}$$

$$y(x) := -\frac{W \cdot (L-a) \cdot x}{6 \cdot E \cdot I \cdot L} \left( L^2 - (L-a)^2 - x^2 \right) - (L-a)$$

$$y\left(\frac{L}{2}\right) = -1.44 \text{ mm}$$

$$y(50 \text{ in}) = -0.486 \text{ mm}$$

$y(2 \cdot s) = ?$

These units are not compatible.

Automatic unit checking and conversion with PTC Mathcad Prime 3.0.

### Calculation

- Numeric evaluation
- Symbolic evaluation, operations, and solving
- Automatic update of results
- Single or multithreaded calculation
- Support for real and complex numbers

### Document creation and editing

- Document-centric, WYSIWYG approach
- Text boxes, blocks, images, tables, plots and equations combined in a single document
- Engineering paper-like grid for easy alignment of text and equations
- Collapsible areas to organize and streamline the document presentation
- WYSIWYG editing of headers and footers
- Find/replace in text and equations
- Toggle between page and draft views
- Save document as XPS and PDF

### Units

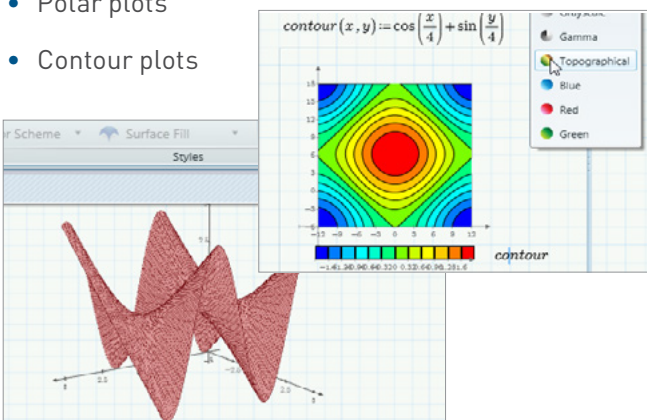
- Comprehensive unit support throughout all numeric and symbolic calculations, functions, solve blocks, tables, vectors / matrices, and plots
- Automatic unit checking and conversion
- Automatic unit reduction and highlighting
- Hundreds of predefined units and ability to easily create more
- Support for SI, USGS, and CGS unit systems

## Functions

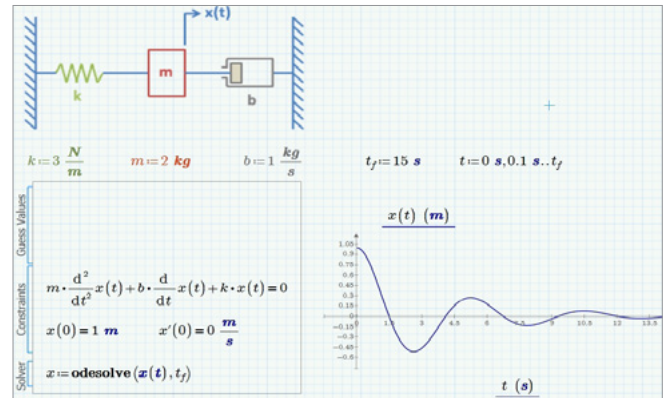
- Hundreds of functions covering wide range of general and special applications
- General purpose basic and advanced functions
  - Trigonometric, hyperbolic, log, exponential, Bessel, Fourier transforms, number theory piecewise continuous, and calculus functions
- Probability and Statistics
  - Probability density, probability distribution, statistics and random number functions
- Curve fitting, smoothing, interpolation and prediction
- Design of Experiments (DoE) functions
  - Design matrices, factor screening, ANOVA, Monte Carlo simulation
- Other special applications
  - Signal processing
  - Image processing
  - Finance
  - Wavelet

## Plotting and graphing

- XY plots: scatter, line, column, bar, stem, waterfall, error, box, effects
- 3-D plots: scatter, surface, curve
- Polar plots
- Contour plots



Complex plots and graphs can be created in PTC Mathcad Prime 3.0.



Easy to read textbook-like solve block format.

## Solving

- Multiple advanced solvers for linear and nonlinear systems of algebraic and differential equations
- Higher-level descriptive math in an easy to read textbook-like solve block format
- State-of-the-art algorithms for nonlinear optimization using the robust and powerful KNITRO<sup>®</sup> engine
- Support for parameterized modeling, enabling solutions to nested complex problems with seamless plot integration
- Ability to incorporate symbolic results into numerical functions

## Vectors and matrices

- Linear algebra operators and functions
- Automatic, element-wise application for many functions and operators
- Easy and intuitive editing

## Data

- Embedded Microsoft<sup>®</sup> Excel<sup>®</sup> component allows bidirectional integration with PTC Mathcad worksheet content
- Spec tables for defining parameters and constants
- Read and write function supporting a variety of data formats (text, Excel, binary, image etc.)
- Specialized data analysis and data manipulation functions

## Programming

- Use familiar programming operators (for-loop, while-loop, if-then-else, etc.) to define functions of any complexity
- Seamless integration of equations within programs

## User interface

- Task-oriented ribbon-based user interface (Microsoft Office Fluent UI)
- Extensive tooltips for all available functionality

## Integration and interoperability

- PTC Creo® Parametric®
- PTC Windchill 10.0
- Open PTC Mathcad Prime 1.0 and 2.0 worksheets
- Convert PTC Mathcad 7 through PTC Mathcad 15.0 using MCD, XMCD Converter
- Microsoft Excel 2003, 2007, 2010

## Resources, help and support

- Integrated, context-sensitive help with live examples
- Integrated access to the PTC LearningConnector
- PTC standard and sustained maintenance support program
- PTC online community
- Integrated license acquisition and management

## Specifications

- 64-bit or 32-bit versions available for Windows® XP (SP3), Windows Vista®, Windows 7
- Available in English, French, German, Japanese, Italian, Spanish, Korean, Russian, and Chinese (Simplified and Traditional)

For more information on PTC Mathcad, visit:

[PTC.com/go/mathcad](http://PTC.com/go/mathcad).

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