Engineering calculations are at the heart of product design, building the foundation for every step of the design process. To achieve excellence in engineering, teams need a comprehensive yet intuitive application that performs calculations with speed and precision, enables traceability, and shows their work. With PTC Mathcad, it's easy.

PTC Mathcad is the leading application for engineering calculations – built to solve, analyze, document, and share engineering math with clarity. It's a powerful calculation tool for engineers, researchers, and technical professionals to easily capture and validate assumptions while preserving calculation IP. In an intuitive environment, Mathcad allows users to work with natural math notation, automatic unit awareness, and traceable design decisions that enable teams to preserve and reuse calculations. Easily communicate ideas with math, text, plots, and images in a single, professionally formatted document that is readable and easy to understand – unlike spreadsheets.

Key Benefits

- Digitally communicate design intent and engineering knowledge
- Intuitively construct calculations using standard math notation for disciplines such as mechanical engineering, AEC, electrical engineering, and more
- Author professional quality documents complete with live math, full-featured plots, rich text, and images
- Repurpose standardized calculations to streamline next generation product development and avoid the need to recreate calculations
- Increase productivity with full units intelligence throughout calculations
- Get direct access to contextual learning materials and tutorials to be more productive faster

Calculation

- Create calculations using standard operator notation for algebra, calculus, differential equations, logic, linear algebra, and more
- Evaluate and solve expressions both numerically and symbolically
- Flexibility to choose between auto and manual calculation modes
- Support for various data types including:
  - Scalar, vectors and matrices
  - Complex numbers

$$H(s) := 3 \cdot \frac{s+4}{s^3+3\,s^2+7\,s+5}$$

$$zeros := s+4 \xrightarrow{solve,\,s} -4$$

$$poles := s^3+3\,s^2+7\,s+5 \xrightarrow{solve,\,s} \begin{bmatrix} -1 \\ -1+2i \\ -1-2i \end{bmatrix}$$

Documentation and presentation

- Multi-document, task-oriented UI
- WYSIWYG document editing
- Document formatting and control
- Full control over text and math formatting
- Collapsible, lockable areas to prevent viewing or modification of proprietary information

$$\overrightarrow{\begin{bmatrix} 125\ Pa \\ 9.8\ \frac{m}{s^2} \\ 20.2\ A \end{bmatrix}} \cdot \begin{bmatrix} 25\ m^2 \\ 4.75\ s \\ 16\ V \end{bmatrix} = \begin{bmatrix} 3125\ N \\ 47\ \frac{m}{s} \\ 323\ W \end{bmatrix}$$

Units management system

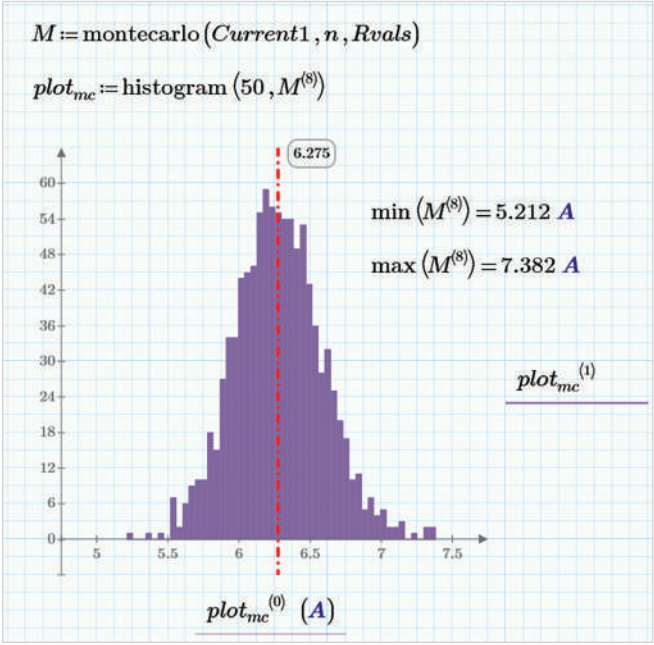
- Comprehensive unit support for numeric calculations, functions, solve blocks, tables, vectors/matrices, and plots
- Automatic unit checking and conversion
- Leverage hundreds of predefined units
- Supports SI, USCS, CGS, and custom unit systems
- Create user-defined units

Content protection

- Prevent accidental or intentional modification of specified calculations with password protection
- Lock content to prevent viewing and hide proprietary information

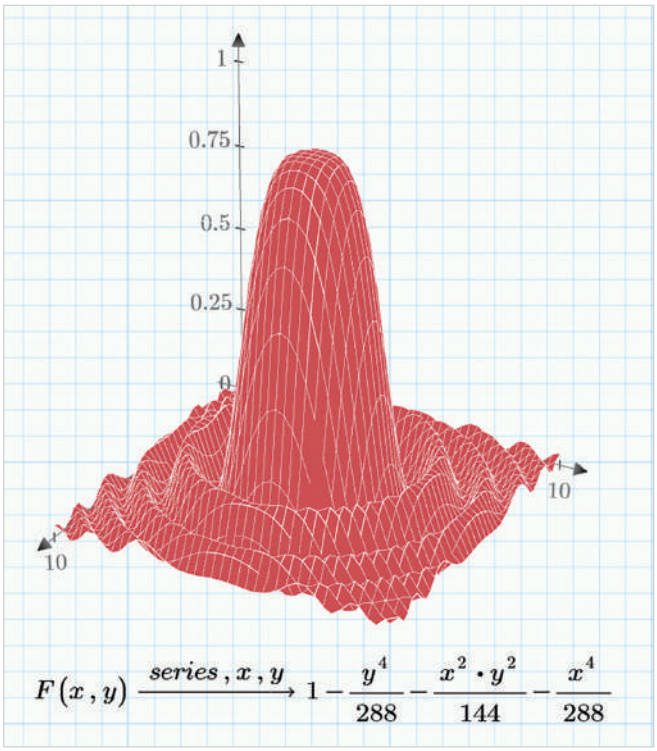
Functions

- Data analysis
- Curve fitting and smoothing
- Probability and statistics
- Signal and image processing
- Differential equations
- Solving and optimization
- File Input/Output
- Design of Experiments
- And hundreds more



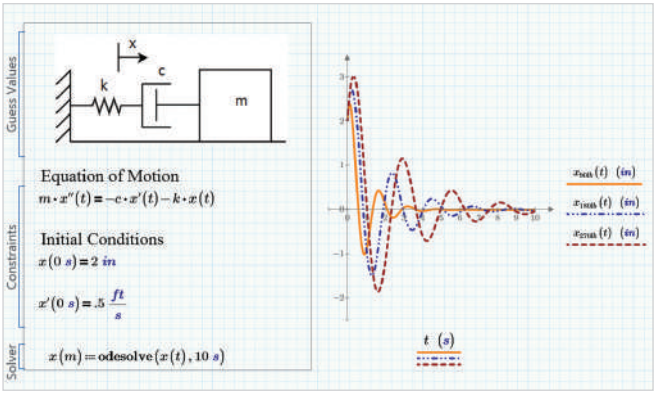
Plotting and graphing

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



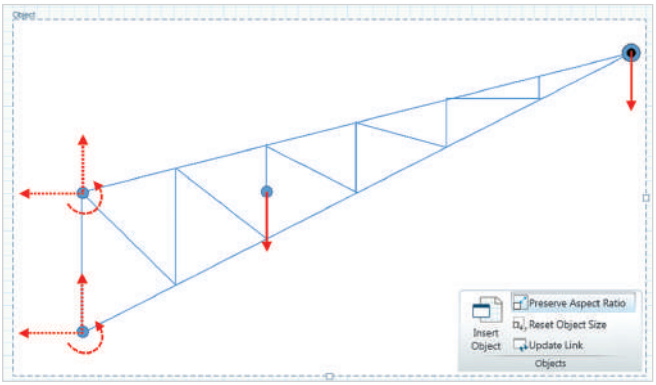
Solving

- Solvers for linear and nonlinear systems of algebraic and differential equations
- Optimize constrained systems
- Display symbolic solutions to systems of equations



Data

- Integrate Microsoft® Excel® component to enable bidirectional data passing with PTC Mathcad worksheet content
- Connect to external data files using read and write functions for various file formats including:
  - Text (.txt)
  - Excel (.xlsx, .xls, .csv)
  - Image Formats
  - Write powerful integrations between PTC Mathcad and your favorite third-party applications using the Mathcad API
- Incorporate embedded content from external applications (OLE)



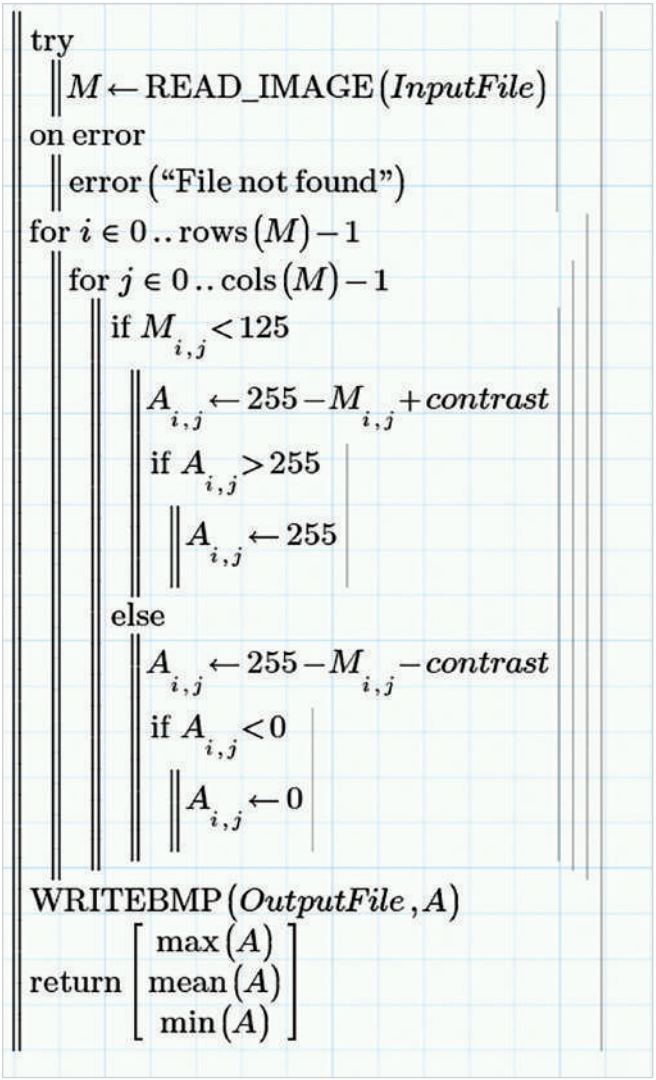
Controls

- Create basic selectable lists of items to calculate using the combo box input control
- Create more advanced selectable lists of items, sliders, check boxes, and buttons to calculate using scripted controls with Python, VBScript, and JScript

Programming

- Add logic using familiar programming constructs and natural math notation
- Loops (for, while)
- Conditional statements (if, else if, else)
- Error catching (try/on error)

Example of Programming in Mathcad



Please visit the PTC Support page for the most up-to-date platform support and system requirements.

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1140747 Mathcad Prime 12 Datasheet