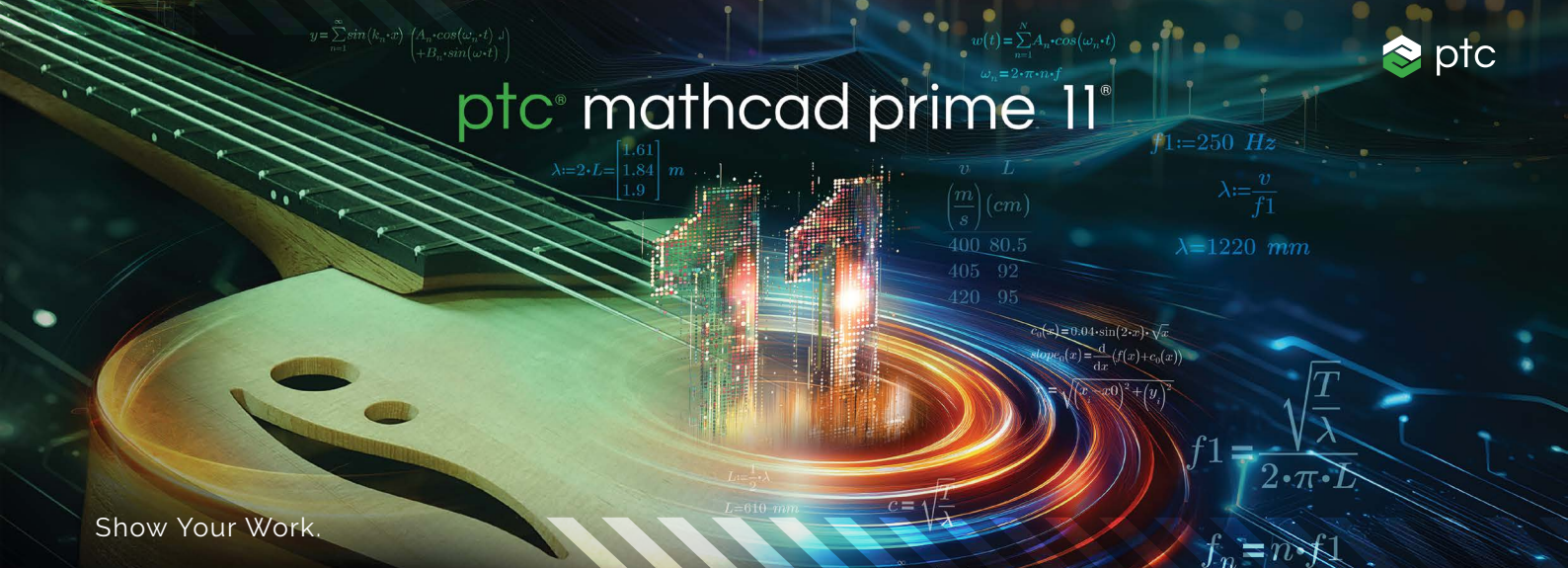


ptc® mathcad prime 11®



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

PTC Mathcad has all your engineering notebook's ease-of-use and familiarity, with live mathematical notation and units intelligence. Most importantly, the calculation capabilities produce far more accurate results than a spreadsheet can provide. Using PTC Mathcad's rich array of mathematical functionality, you can document your most critical engineering calculations as easily as you can write them. Show your work using rich formatting options alongside plots, text, and images in a single, professionally-formatted document. Nobody needs specialized skills to create or consume PTC Mathcad data.

When your intellectual property is shareable, easily readable, and lives in one place, you've moved from managing information to making it a source of competitive advantage.

Key Benefits

- Digitally communicate design intent and engineering knowledge
- Intuitively construct calculations using standard math notation
- 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 instant access to learning materials and tutorials from within the product to get 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
 - Create selectable lists of items to calculate using the combo box input control

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

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

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

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

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

Units management system

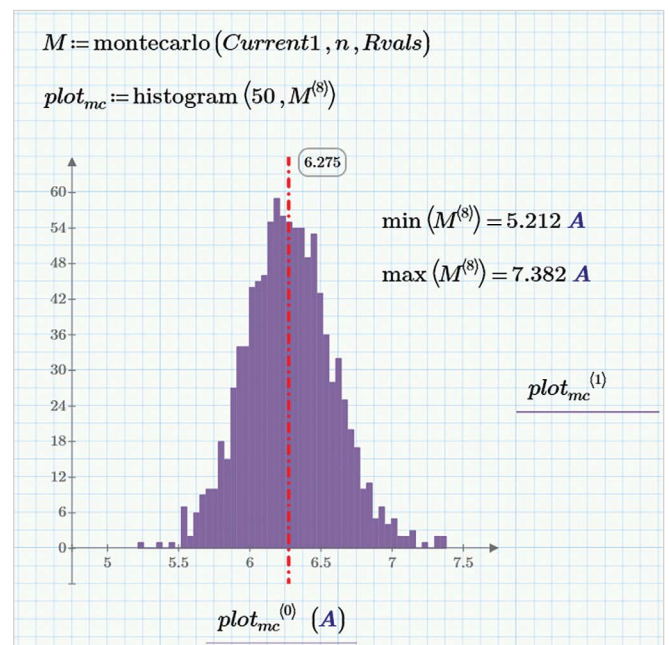
- Comprehensive unit support for numeric calculations, functions, solve blocks, tables, vectors/matrices, and plots
- Automatic unit checking and conversion
- Leverage hundreds of predefined units
- Supports SI, USCS, CGS, and custom unit systems
- Create user-defined units

Content protection

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

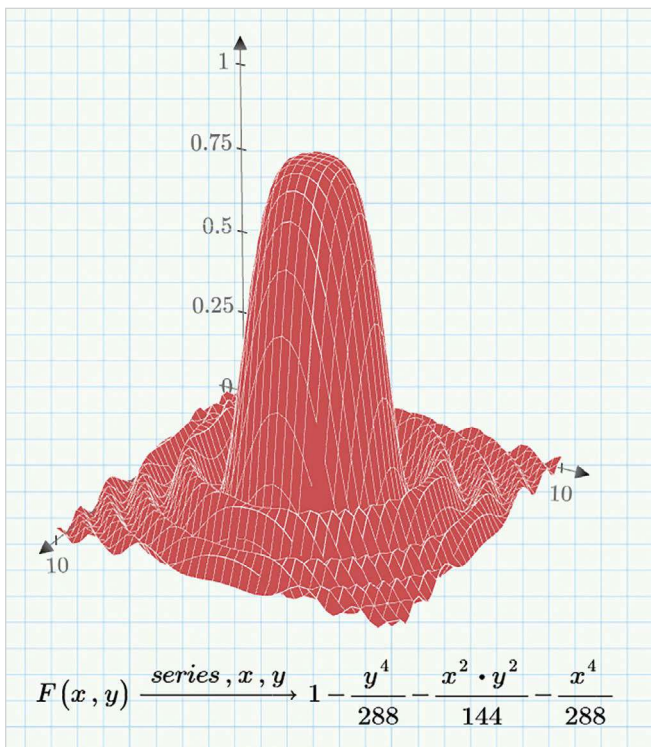
Functions

- Data analysis
- Curve fitting and smoothing
- Probability and statistics
- Signal and image processing
- Differential equations
- Solving and optimization
- File I/O
- Design of experiments
- And hundreds more



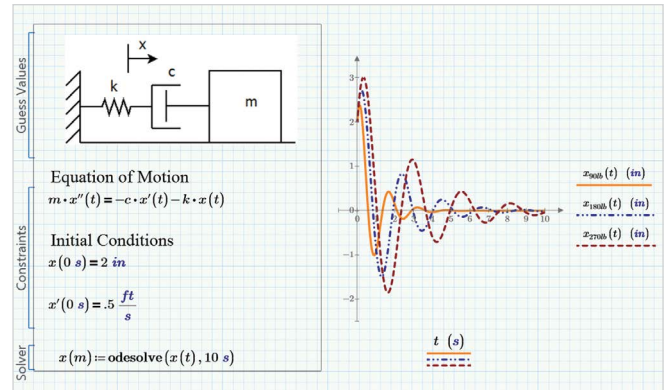
Plotting and graphing

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



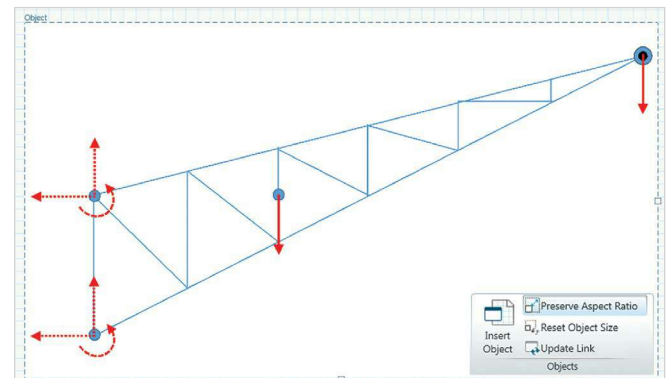
Solving

- 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 (.bmp, .jpg)
- 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

```

try
  ||  $M \leftarrow \text{READ\_IMAGE}(InputFile)$ 
on error
  || error("File not found")
for  $i \in 0 \dots \text{rows}(M) - 1$ 
  || for  $j \in 0 \dots \text{cols}(M) - 1$ 
    || if  $M_{i,j} < 125$ 
      ||  $A_{i,j} \leftarrow 255 - M_{i,j} + contrast$ 
      || if  $A_{i,j} > 255$ 
        ||  $A_{i,j} \leftarrow 255$ 
    || else
      ||  $A_{i,j} \leftarrow 255 - M_{i,j} - contrast$ 
      || if  $A_{i,j} < 0$ 
        ||  $A_{i,j} \leftarrow 0$ 
WRITEBMP( $OutputFile, A$ )
return  $\begin{bmatrix} \max(A) \\ \text{mean}(A) \\ \min(A) \end{bmatrix}$ 

```

Please visit the [PTC Support page](#) for the most up-to-date platform support and system requirements.

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