

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, protects intellectual property, 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

- Securely 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.
- 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

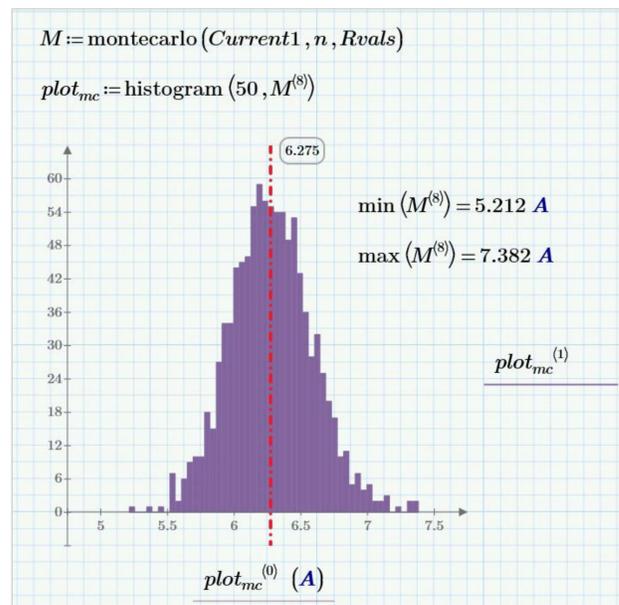
- Comprehensive unit support for numeric and symbolic calculations, functions, solve blocks, tables, vectors/matrices, and plots
- Automatic unit checking and conversion
- Leverage hundreds of predefined units
- Define custom units

### Content protection

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

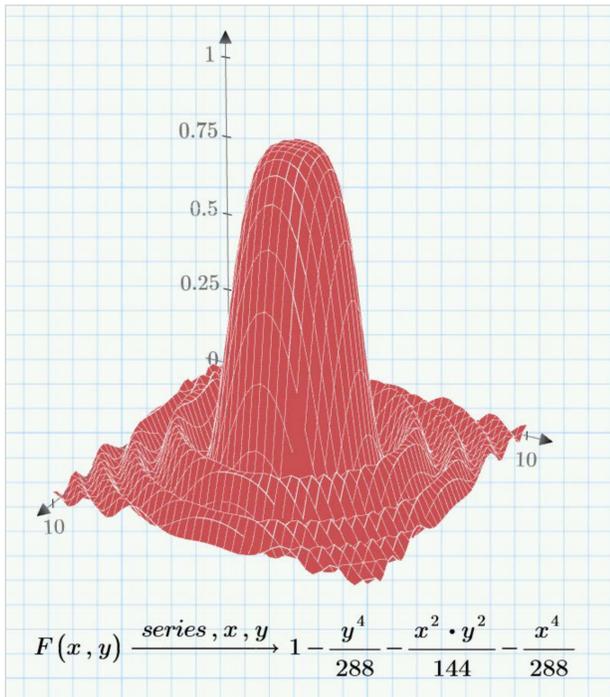
### Functions

- 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



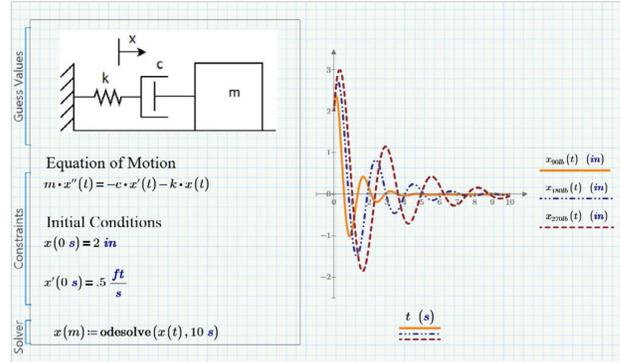
### Plotting and graphing

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



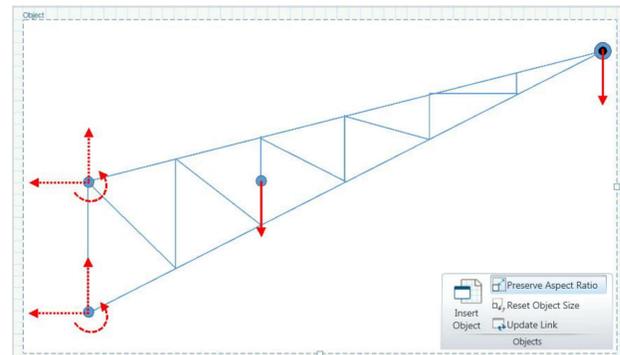
### Solving

- 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)

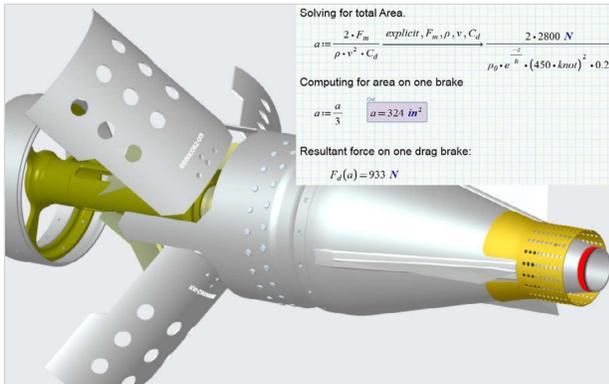


### Controls

- 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

### Engineering Notebook, Powered by PTC Mathcad

- Document design intent by embedding PTC Mathcad worksheets directly within a PTC Creo part or assembly
- Drive PTC Creo models from PTC Mathcad results
- Reference PTC Creo parameters as inputs to PTC Mathcad calculations



### 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)

```

try
  M ← READ_IMAGE(InputFile)
on error
  error("File not found")
for i ∈ 0 .. rows(M) - 1
  for j ∈ 0 .. cols(M) - 1
    if Mi,j < 125
      Ai,j ← 255 - Mi,j + contrast
      if Ai,j > 255
        Ai,j ← 255
    else
      Ai,j ← 255 - Mi,j - contrast
      if Ai,j < 0
        Ai,j ← 0
WRITEBMP(OutputFile, A)
return [
  max(A)
  mean(A)
  min(A)
]
    
```

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

© 2024, PTC Inc. (PTC). All rights reserved. Information described herein is furnished for informational use only, is subject to change without notice, and should not be taken as a guarantee, commitment, or offer by PTC. PTC, the PTC logo, and all PTC product names and logos are trademarks or registered trademarks of PTC and/or its subsidiaries in the United States and other countries. All other product or company names are property of their respective owners. The timing of any product release, including any features or functionality, is subject to change at PTC's discretion.

391451\_Mathcad9.0\_DS\_0124