PTC® Mathcad®

PTC Mathcad Roadmap

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Agenda

• What is PTC Mathcad?

• Release Timeline

• Prime 3.1
  – Engineering Notebook

• Prime 4.0

• Future Release Themes
What is PTC Mathcad?

A digital engineering notebook to perform your engineering calculations and manage your design intent

- Analyze
- Solve
- Document
- Share

PTC Mathcad combines the ease and familiarity of an engineering notebook with a powerful mathematical engine

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PTC Mathcad Product Roadmap

**PTC Mathcad Prime**
- Major releases with new functionality
- Maintenance releases to address customer-reported issues when necessary

**PTC Mathcad 15.0**
- Maintenance releases to address customer-reported issues, platform and/or technology changes
- No new features
- Discontinue only when full migration to Prime can take place for majority of customers
PTC Mathcad Prime 3.1

Released March 2\textsuperscript{nd}, 2015

- **Functionality**
  - New PTC Creo integration
    - 3 use cases for CAD engineer
  - API
    - Re-written to be cleaner and more efficient
    - Extensive SDK with a dozen code examples including source code to SolidWorks integration
    - Foundation future expansion of PTC Mathcad capabilities
  - Large data handling
    - For 64-bit architectures, data set sizes are no longer limited to 2 gigabyte ceiling
  - Windows 8.1 support
  - Connectivity with third party tools
    - Prode\textsuperscript{©} physical properties, CoolProp\textsuperscript{©} fluid properties, ODBC-compliant databases
    - Export algorithms to drive CAD surfaces through STL, DXF or IBL formats
    - Read and write in HDF5 files
    - Export matrices to C++
    - PTC Mathcad Worksheet Libraries
      - Over 1,500 pre-built worksheets across:
        - Mechanical, Electrical, Civil Structural, Chemical, Applied Math and Education
      - Scripts to convert legacy e-books & create HTML TOCs

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Engineering Notebook, powered by PTC Mathcad
3 use cases for PTC Creo user

Document Design Intent

Analysis Driven Design

Verification and Validation

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Capture design intent inside your model

- **Embed** a PTC Mathcad worksheet directly **within** the PTC Creo model
- Embedded worksheet can be opened, edited and saved within the PTC Creo model
- All design details in the worksheet automatically travel with the PTC Creo model
Share parameters between PTC Creo and PTC Mathcad

• **Analysis Driven Design**
  – Solve calculations and use the results as dimensions within the PTC Creo model

• **Verification and Validation**
  – PTC Creo parameters further analyzed with PTC Mathcad’s extensive array of math tools
Share parameters between PTC Creo and PTC Mathcad

• Tag parameters in the embedded PTC Mathcad worksheet
  – Inputs – values from PTC Creo to PTC Mathcad
  – Outputs – values from PTC Mathcad to PTC Creo

• PTC Mathcad input definitions and output evaluations are made available in **parameters table**

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**Values from Creo Parametric**

- Piston bore diameter
  - \( d_{bore} = 1 \text{ mm} \)

- Effective crankshaft radius
  - \( r_{crankshaft} = 1 \text{ mm} \)

**Engineering Notebook Powered by PTC Mathcad Outputs**

- Radius of piston head spherical cap
  - \( r_{ph} = 35.500 \text{ mm} \)

- Height of piston head spherical cap
  - \( h_{ph} = 1.000 \text{ mm} \)
Share parameters between PTC Creo and PTC Mathcad

- **PTC Mathcad inputs & outputs can be used in Relations like any other native PTC Creo parameter**
  - Relate PTC Mathcad inputs to parameters in PTC Creo to use PTC Creo values in PTC Mathcad
  - Relate PTC Mathcad outputs to parameters in PTC Creo to use PTC Mathcad values in PTC Creo
PTC Mathcad Roadmap
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PTC Mathcad Prime 4.0

• Performance improvements in large document manipulation

• Plot enhancements
  – Embed 3rd party tool to match PTC Mathcad 15.0 plots on first release

• PTC Mathcad as an OLE container

• Worksheet content protection
  – Area protection
  – Area locking

• Improved external app interoperability
  – Copy multiple regions to clipboard

• Equation wrapping

• Computational enhancements

• PTC Mathcad Gateway (calculation server)

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Performance Improvements

- **Performance improvement of worksheet-level operations**
  - Adding and removing whitespace
  - Separating and moving regions
  - Region selection
  - Etc.

- **Performance improvement of region-level operations**
  - Text editing
  - Switch to draft mode
  - Pushing regions down
  - Etc.

<table>
<thead>
<tr>
<th>Main Improvements</th>
<th>Improvement (Worksheet dependent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching between Page/Draft mode</td>
<td>Improved 10 – 30 times</td>
</tr>
<tr>
<td>“Orientation” - Page Orientation change (Portrait/Landscape)</td>
<td>Improved 10 – 100 times</td>
</tr>
<tr>
<td>“Letter” - Page size change (change page formats A3, A4, …)</td>
<td>Improved 10 – 40 times</td>
</tr>
<tr>
<td>“Margin” – Margin switch between Standard, Narrow and Wide</td>
<td>Improved 10 – 40 times</td>
</tr>
<tr>
<td>“Grid Size” – Grid size switch between Fine and Standard.</td>
<td>Improved 10 – 15 times</td>
</tr>
<tr>
<td>“Show Grid”</td>
<td>Improved 5 – 10 times</td>
</tr>
<tr>
<td>“Add Space”</td>
<td>Improved 5 – 10 times</td>
</tr>
<tr>
<td>“Remove Space”</td>
<td>Improved 5 – 10 times</td>
</tr>
<tr>
<td>“Add Page Break”</td>
<td>Improved 1.5 – 2 times</td>
</tr>
<tr>
<td>“Separate Regions”</td>
<td>Some improvement</td>
</tr>
<tr>
<td>Select All</td>
<td>Improved 10 – 40 times</td>
</tr>
<tr>
<td>Un-Select All</td>
<td>Improved 10 – 40 times</td>
</tr>
<tr>
<td>Math format changes on selected items</td>
<td>Some improvement</td>
</tr>
<tr>
<td>Text format changes on selected items</td>
<td>Some improvement</td>
</tr>
<tr>
<td>Collapse Area</td>
<td>Some improvement</td>
</tr>
</tbody>
</table>
PTC Mathcad 15.0 X-Y Plots
1) Insert Chart object
2) Type data series

\[ X = \begin{bmatrix} 1 \\ 3 \\ 4 \\ 5 \\ 8 \\ 9 \end{bmatrix}, \quad Y = \begin{bmatrix} 8 \\ 10 \\ 5 \\ 2 \\ 7 \\ 8 \end{bmatrix} \]

\[(X, Y) \]

*Chart Viewer*

Forward looking information, subject to change without notice
3) Double-click chart area to activate chart + its associated UI
4) Select a plot type. Default trace formatting appears + context-sensitive tab
5) On the relevant tab, “Background” on top-left drop-down and then specify fill.
5) Close external app to return to PTC Mathcad

Forward looking information, subject to change without notice
PTC Mathcad as an OLE container

- Ability to embed applications as OLE objects within the worksheet
  - Any OLE object available on the system
  - Can embed new or from file
  - Can link to file
Content Protection – Area Protection/Locking

- Protect/Lock an Area from Edit
  - Details:
    - Protect from edit and optional lock Area state
    - Password or no Password
    - New RMB option and new RMB on expand icon
    - Default no timestamp, no Area state lock
  - Includes:
    - Protect content from edit (password/no password)
    - Lock area display state (open, closed, no lock)
  - DOES NOT include:
    - Obscured data in file when area locked closed

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PTC Mathcad Prime 4.0 content

Improved external app interoperability – copy multiple regions to Word

• Select/copy multiple regions and paste in Word (3rd party apps)

• Details:
  – User can select multiple regions (contiguous or non-contiguous) and ‘copy’
    • Makes available on the clipboard for paste into third party applications, such as Microsoft Word
  – Text pasted:
    • Keep Source Formatting – maintain Mathcad spacing and formatting, paste regions as images in text boxes except text, which is pasted as text in text boxes
    • Merge Formatting – strip Mathcad spacing and text formatting, paste regions as images and text
  – Maintain hard page breaks if copied as part of continuous selection
Equation Wrapping

• Allow an equation to be split/wrapped as specific points

• Details:
  – Allow wrapping at addition, subtraction, inline division and explicit multiplication operators.
  – Two ways to enter equation break:
    • As you type – shift+enter moves operator to next line
    • Editing an equation – shift+enter moves all to the right (+ possible extra) to next line
  – Where allowed:
    • Definitions
    • Top level placeholder
    • Major placeholders of operators
  – Where not allowed:
    • Minor placeholders
    • Symbolic results

\[ C31 = -\frac{Hz \cdot e^2}{2} - \frac{Hz \cdot a_1}{2} - \frac{Fc1 \cdot a_1^3 + 2 \cdot Gz \cdot a_1^3}{6 \cdot a_1} - Hz \cdot e_2 \cdot a_1 \]
PTC Mathcad Gateway

- PTC Mathcad Gateway is a calculation server that provides access to your company’s certified engineering calculations for any user, anytime, on any device. Users can obtain quick calculation results for their specific scenarios without exposing valuable company IP.
Subsequent Release Themes

• Plot Improvements
  – Utilize more capabilities from 3rd party tool

• Functionality
  – Constrained inputs (input controls)
  – Picture operator
  – Text styles
  – Hyperlinks
  – Program debugging
  – Redefinition warnings
  – Scripted components
  – Gradient operator
  – PDESolve

• Integration Improvements
  – PTC Creo integration phase II
  – API enhancements
  – Additional 3rd party integrations