

# Mathcad® Engineering Libraries

Bring powerful engineering resources directly to your desktop

Mathcad engineering libraries deliver hundreds of standard calculation procedures, formulae and reference tables used by civil, electrical, and mechanical engineers. Because these resources are delivered electronically for use within Mathcad, you can apply them in every project with ease and speed.

Explanatory text and examples give you detailed background and guidance on how to use the equations. In addition, each title includes keyword search, a hyperlinked table of contents and hyperlinked indexing. Once you install an engineering library to your desktop, you gain immediate access to an interactive, engineering reference library at any time from your Mathcad menu bar.

Optimize your Mathcad solution with one or more of the following selections:

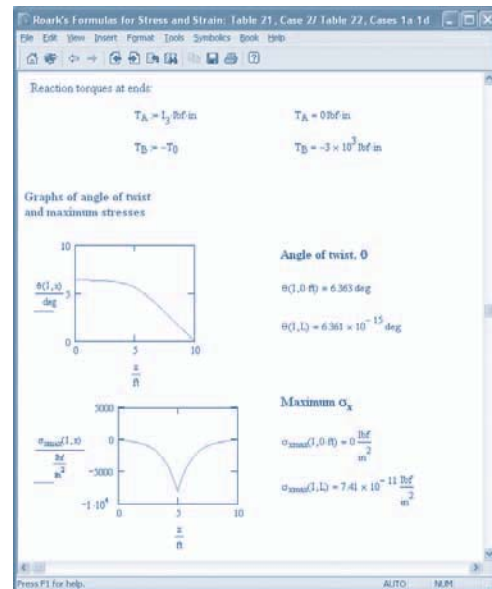
- Mathcad Civil Engineering Library
- Mathcad Electrical Engineering Library
- Mathcad Mechanical Engineering Library

Mathcad Engineering Libraries are delivered in E-books, which give you interactive, live access to everything you'd find in hard copy reference books. Because the books are electronic, you get all the features you expect from an electronic reference tool, such as hyperlinks, browsing and keyword search. These E-books deliver unique benefits because you can view them in Mathcad and have full access to all of Mathcad's calculation and graphing features. You can modify the inputs and equations to build your own models, explore the content by working directly in the book, or drag content into your own Mathcad worksheets.

As you change input parameters and equation definitions, Mathcad recalculates.

## Key Benefits and Capabilities

- Leverage standard libraries to solve design engineering problems
- Gain instant electronic access to critical engineering resources
- Work faster and easier using live, interactive content
- Easily copy content, including live equations, from the libraries to your own worksheets



The Mathcad Civil Engineering Library includes Roark's Formulas for Stress and Strain.

## Contents

### Mathcad Civil Engineering Library

Get three best-selling Mathcad E-books on a single CD:

Roark's Formulas for Stress and Strain, 6th Edition—Receive the complete edition, with more than 1,000 separate design cases covering straight beams and bars, curved beams, plates and shells. Also included are all 37 tables of formulas in Roark's and more than 75 detailed example problems worked out in Mathcad.

Sample Topics—Column buckling and elastic stability; stress, force and deflection calculations for beams; combined stress formulas; curved beam cross-section properties; moments of inertia; torsional loading; beam analysis for a varying section; stresses and deflection of flat plates; discontinuity analysis results at the junction of shells and plates; natural frequencies of plates; bending and membrane stresses of thin-walled pressure vessels; radial displacements; buckling of shells.

**Building Thermal Analysis**—This E-book couples real-life examples of building thermal design problems with theory, creating an informative group of design documents. This E-book is an extremely useful design tool for engineers and architects who analyze heat transfer in buildings.

**Sample Topics**—Steady state heat conduction in multi-layered walls and pipes; transient heat conduction in buildings; analysis of heat conduction in walls; periodic heat flow in multi-layered walls; convection and infiltration in rooms and cavities; solar radiation; psychometry and thermal comfort.

**Building Structural Design: Reinforced Concrete and Structural Steel Applications**—Features valuable Mathcad problem-solving techniques in the context of common engineering calculations for structural design. These applications use Mathcad's complex arithmetic, matrix operators, equation solving power and plotting capabilities to provide a reference source of Mathcad methods and formulas.

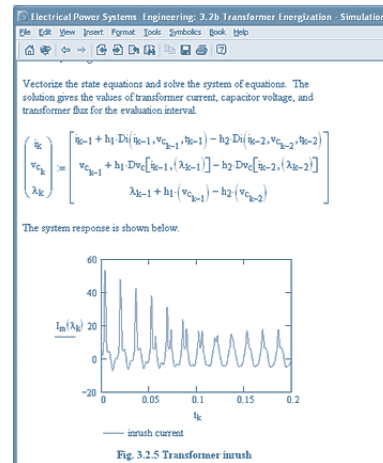
**Sample Topics**—Analysis of simple beams and beams with end moments; section properties of composite steel beams; structural steel and reinforced concrete columns; effective length factors; reinforced concrete flat plates; spread footings and pile caps; retaining walls and anchored bulkheads; shear stud capacities.

### Mathcad Electrical Engineering Library

More than 130 sections of key electrical engineering topics in three E-books:

**Electrical & Electronic Engineering from Hicks**—Adapted from the Standard Handbook of Engineering Calculations (edited by Tyler G. Hicks), this title delivers electrical and electronics engineering formulae and procedures, supported with explanatory text, tables and figures.

**Sample Topics**—Direct-Current Circuit Analysis; Power System Short-Circuit Current; Transformer Characteristics and Performance; Electrical Measurement Analysis of Permanent-Magnet Motors; Solid-State Device Evaluation; Reliability Analysis of Electronic Circuits; Equipment to Network Synthesis by Using an Operational Amplifier; Microwave Transmitter Analysis; Analysis of Images Produced by Concave or Plane Mirrors; Compound Thin-Lens Analysis.



The Electrical Engineering Library offers information on fundamental concepts for modeling electrical power distribution systems.

**Electrical Power Systems Engineering**—This title explores fundamental concepts for modeling electrical power distribution systems, providing analysis techniques necessary to design a functioning system, and locating potential difficulties in a proposed design. Immediately apply hundreds of calculation procedures to find solutions in the design and implementation of power distribution and power conversion systems.

**Sample Topics**—Voltage Drop Calculations; Load Flow Calculations; Least-Cost Power Transformer Sizing; Power System Harmonic Analysis; Power Line Parameters; Impedance of Lines; Characteristics of Aluminum Cable; Power System Faults; Mid-Line Fault Calculations; Out-of-Step Protection; Induction Motor Start-up Protection; DC Motor Protection; System Transients; Transformer Energization; Typical Transformer Impedances; Application of Surge Arresters.

**Topics in Mathcad: Electrical Engineering**—Useful Mathcad problem-solving techniques in the context of common design calculations from several different branches of electrical engineering, such as circuit analysis or digital filter design. These applications use Mathcad's complex arithmetic, matrix operators, equation solving power, and plotting capabilities to provide a reference source of Mathcad methods and formulas.

**Sample Topics**—Antenna Arrays; Waveguides; Transmission Lines; Network Analysis; Feedback and Stability Criteria; Two Port Networks, Convolution and Deconvolution, Quantization, Transforms; IIR Filter Design; FIR Filter design.

### Mathcad Mechanical Engineering Library

Includes the following three Mathcad E-books:

Roark's Formulas for Stress and Strain, 6th Edition—Receive the complete edition, with more than 1,000 separate design cases covering straight beams and bars, curved beams, plates and shells. Also included are all 37 tables of formulas in Roark's and more than 75 detailed example problems worked out in Mathcad.

Sample Topics—Column buckling and elastic stability; stress, force and deflection calculations for beams; combined stress formulas; curved beam cross-section properties; moments of inertia; torsional loading; beam analysis for a varying section; stresses and deflection of flat plates; discontinuity analysis results at the junction of shells and plates; natural frequencies of plates; bending and membrane stresses of thin-walled pressure vessels; radial displacements; buckling of shells.

Finite Element Beginnings—An introduction to the principles of finite element method. Designed for those who use existing finite element packages and want a deeper theoretical understanding of the methodology, it is an ideal foundation for establishing finite associated applications. Engaging and informative, the book looks behind the scenes, and offers many examples to help develop your understanding of finite element method.

Sample Topics—Historical perspective of the finite element method; basic concepts of linear elasticity; principles of minimum potential energy and direct method; using interpolation concepts in one and two dimensions; mapped elements.

Machine Design and Analysis (from Hicks's Standard Handbook of Engineering Calculations)—This interactive reference tool is based on more than 125 machine design, analysis and metalworking calculation procedures from the classic McGraw-Hill reference work. Each section has a working Mathcad calculation procedure mirroring one in the original book, supported with explanatory text, tables of data, scanned-in figures, Mathcad plots and Mathcad built-in units.

Sample Topics—Shaft, torque, horsepower and driver efficiency; shaft reactions and bending moments; solid shafts in bending and torsion; speeds of gears and gear trains; force ratio of geared drives; wear life of roller surfaces; time and power to drill, bore, countersink and ream; shock-mount deflection and spring rate; economical cutting speeds and production rates.

### Specifications for Mathcad Engineering Libraries

- Mathcad
- Windows® XP, 2000 or higher
- If installing to the hard drive:
  - 125 MB of disk space (Civil Engineering Library)
  - 20 MB of free hard disk space (Electrical Engineering Library)
  - 140 MB of disk space (Mechanical Engineering Library)
- CD-ROM (The library may be run from the CD.)
- Available in English only

### For More Information

For more information on any Mathcad Engineering Library, visit [www.ptc.com/go/mathcad](http://www.ptc.com/go/mathcad)