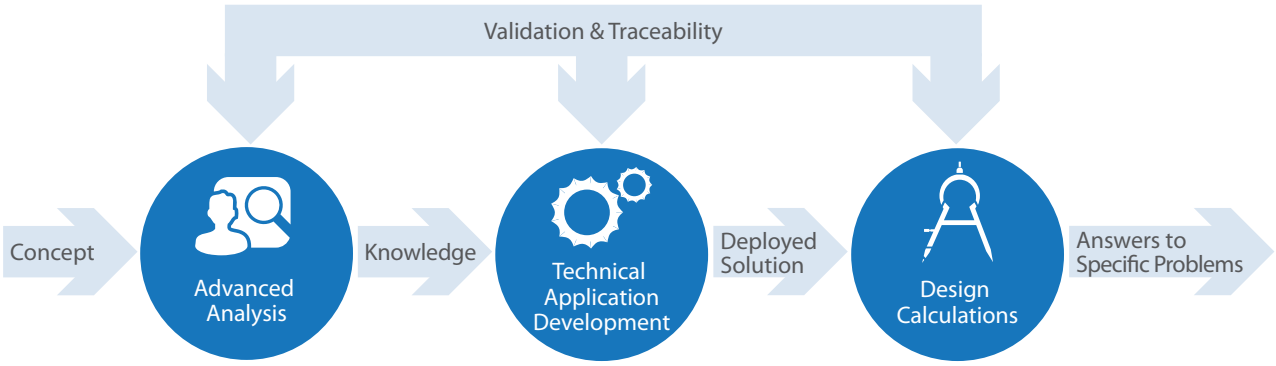
Maple™: From Concept to Deployment

Maple™ provides a complete environment for rapid technical solution development within any technical organization. From original concept to solutions deployed in the field, Maple is with you every step of the way.

Maple™



Advanced Analysis

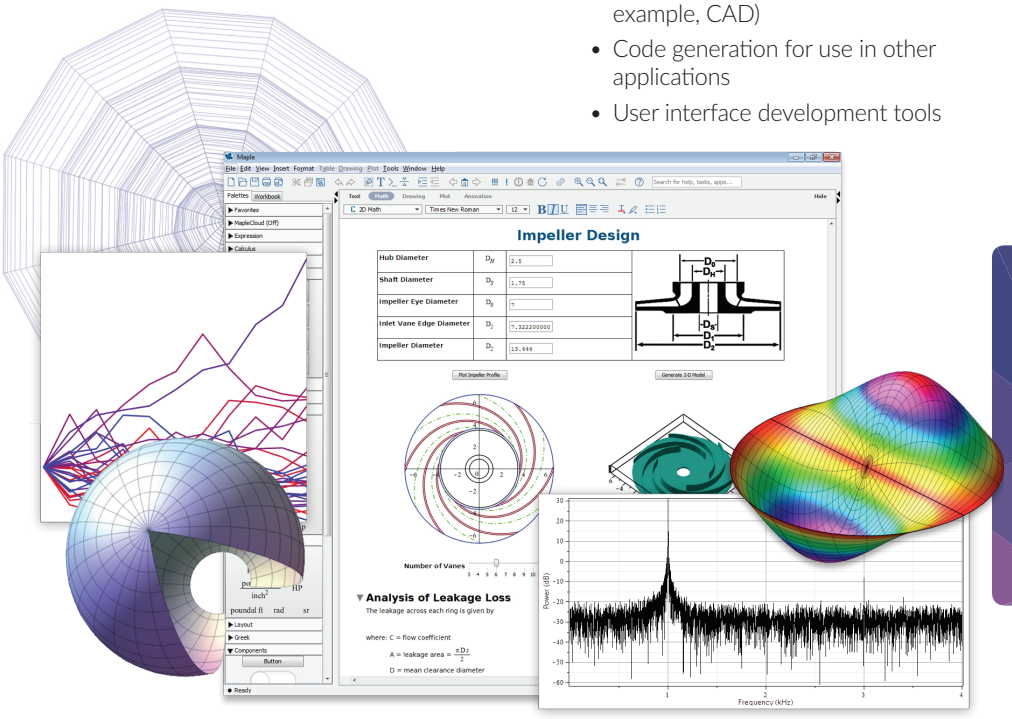
- Intuitive problem entry
- Powerful symbolics
- Advanced numerics
- Data import/export and plotting
- Rich environment for technical documentation

Technical Application Development

- Powerful, flexible language
- Parallel computation
- Advanced code development tools
- Built-in numeric algorithms (for example, signal processing and optimization)
- Data import/export and plotting
- Connectivity with other tools (for example, CAD)
- Code generation for use in other applications
- User interface development tools

Design Calculations

- Multiple deployment options include those that do not require the use of Maple by the end user:
  - The free Maple Player™
  - Online through a MapleNet™ web server
  - Maple
- Intuitive user interface – no knowledge of Maple required
- Easy entry of equations and data
- Meaningful presentation of results
- Illuminating visualizations
- Print-ready documents



With Maple, you get a strong connection between your engineering knowledge and the final applications, so the understanding behind the applications is preserved, the process can be validated, and the code more easily updated.

Key Features

Mathematics

Maple includes over 5,000 computational functions covering virtually every area of mathematics, including:

- Abstract Algebra
- Algebra
- Algebraic Curves
- Calculus
- Combinatorial Functions
- Combinatorial Structures
- Complex Arithmetic and Functions
- Curve Fitting
- Differential Algebra
- Differential Equations
- Differential Forms
- Differential Geometry
- Discrete and Integral Transforms
- Dynamic Systems
- Euclidean Geometry
- Financial Mathematics
- Fluid Properties
- Gaussian Integers
- Generating Functions
- Graph Theory
- Group Theory
- Lie Symmetries
- Linear Algebra
- Linear Functional Systems of Equations
- Linear Operators
- Linear Programming
- Linear Recurrence Equations
- Logic
- Numerical Approximations
- Number Theory
- Optimization
- Orthogonal Polynomials
- P-adic Numbers
- Physics
- Polynomials
- Polynomial Systems
- Q-Difference Equations
- Rational Normal Forms
- Real Domain Computations
- Series Expansions
- Scientific Constants
- Scientific Error Analysis
- Signal Processing
- Special Functions
- Statistics
- Statistical Process Control
- Symbolic-Numeric Algorithms for Polynomials
- Tensors
- Time Series Analysis
- Tolerances
- Units and Dimensions
- Variational Calculus
- Vector Calculus

Symbolic and Numeric Computations

- Work with exact quantities such as fractions, radicals, and symbols, eliminating accumulated round-off errors
- Choose from a variety of exact and approximate techniques, as best suits your needs
- Approximations can be computed at any precision that is required, and are not restricted by hardware limitations
- Solvers use a combination of symbolic and numeric techniques, allowing them to solve problems for which either approach alone would be insufficient

Visualization

- 2-D and 3-D graphs and animations, created through menus, commands, and interactive assistants
- Over 170 plot types and options, including implicit, contour, complex, polar, vector field, conformal, density, ODE, PDE, engineering, and statistical plots
- Smart plot view automatically focuses on the region of a 2-D plot that is most meaningful
- Light modeling, legends, axis control, titles, glossiness, gridlines, and transparency
- Display typeset text and mathematical expressions in plot titles, labels, legends, tickmark labels, and axis labels
- International (non-English) characters in titles, legends, and labels
- Plot annotations for 2-D and 3-D plots include arrows, shapes, and drawing tools
- Zoom and pan 2-D and 3-D plots and animations
- Real-time rotation of 3-D plots
- Fly-through animations of 3-D plots using user-defined camera paths
- Interactive control of parameters through sliders
- Live Data Plots for creating and customizing statistical plots such as area charts, histograms, and pie charts
- Standard geometric objects, regular solids, and polyhedra
- Layering of graphics and animations of different types
- Wide variety of coordinate systems

User Interface

- Easy problem entry with Clickable Math™ features, including a math equation editor, palettes, Smart Popups, Drag-to-Solve™, and self-documenting context menus
- Technical document environment with comprehensive word processing tools, including a spell-checker that understands math terminology
- Hundreds of task templates for fill-in-the-blank problem solving
- Interactive assistants for many tasks, including equation manipulation, analyzing ODEs and ODE systems, creating plots and matrices, converting units, and exploring parameters in expressions
- Command completion and code editor
- Tables, symbolic spreadsheets, code regions, drawing canvas, and interactive components such as buttons, sliders, and dials
- MapleCloud™ for easy exchange of documents and Math Apps with colleagues

Programming

- Full featured programming language for scripts, programs, and full applications
- Interpreted language supports easy exploration and fast prototyping
- Procedural, functional, and object oriented programming
- Advanced features include operator overloading, assumptions on variables, and exception handling
- Debugging, profiling, security, and library management tools
- Source code of most routines available for viewing
- Create and manipulate many kinds of data structures, including sets, strings, lists, arrays, stacks, queues, records, and modules
- Tools for manipulating mathematical objects, including polynomials, integrals, and sums
- Powerful type system, including ability to extend existing types
- Generate and manipulate Maple worksheets through their XML representation
- User-level routines for multi-threaded and multiprocess programming on multi-core computers
- Compiler package, CUDA™ support, parallel algorithms, and optimization tools promote highly efficient user code for numeric computations
- External function interface for transparent access to dynamic libraries
- Interactive embedded components include buttons, sliders, plots, check boxes, list boxes, toggle buttons, radio buttons, dials, gauges, data tables, videos, microphone, speaker, and mathematical expression boxes for entering and displaying 2-D math
- Customizable context-sensitive menus
- Tools for building interactive applications

Connectivity

- Code generation for C, C#, Fortran, Java, JavaScript®, Julia, MATLAB®, Perl, Python®, R, and Visual Basic
- Internet connectivity
- MATLAB connectivity includes two way integration and code translation
- Mathematica® Notebook conversion and command translation tools
- OpenMaple™ API for C, C#, Java, and Visual Basic programs
- External calling to Java, C, C#, and Fortran
- Connect with Microsoft® Excel®, databases, and CAD systems
- MathML 2.0 presentation and content support
- Access millions of online time series data sets
- Import and export of XML documents
- Export documents to HTML, XML, MathML, LaTeX, RTF, PDF, and ePUB
- Export plots to BMP, DAE, DXF, EPS, GIF, HPGL, JPEG, PCX, PLY, POV, STL, TEK, WMF, X3D, and more
- Import, manipulate, and export data from WAV, JPEG, and TIFF files
- Import data from ASCII, CSV, DIF, JSON, MATLAB, Matrix Market, Microsoft Excel, ODS, and more
- Deploy solutions through the Maple Player, MapleCloud, or MapleNet