CHEMCAD is Chemstations' integrated suite of intuitive chemical process simulation software that broadens an engineer’s capabilities and increases productivity.

CHEMCAD fits into the chemical engineering work flow and supercharges an engineer’s efficiency when facing the toughest chemical process models or addressing day-to-day challenges.
Engineering advanced. The CHEMCAD® suite of chemical process simulation software powerfully advances the chemical engineering thought process and intuitively adapts to an engineer’s work flow when simulating chemical, petrochemical, pharmaceutical, and environmental processes. CHEMCAD is flexible enough to handle virtually any challenge, yet it operates within a single graphical user interface. And it’s backed by the best technical support in the industry.

CHEMCAD has the power and tremendous range of capabilities to meet an engineer’s chemical process simulation needs, from day-to-day challenges to large, multifaceted projects.

Its open architecture fits into the chemical engineering computing environment and allows for smooth interaction with other commonly used programs, while its intuitive graphical user interface enables engineers to do their jobs more efficiently and boost productivity.

CHEMCAD is scalable and allows users to purchase only the features they need for a specific industry and process, enabling them to create their own customized version. Each module in the suite can be purchased separately and all modules work together within the same interface, resulting in maximum flexibility and affordability.

CHEMCAD offers numerous benefits that advance the engineering process and save users both time and money.

- Has been shown to:
  - Increase productivity by an average of 25 percent
  - Reduce costs by an average of 30 percent
  - Improve accuracy of calculations by up to 80 percent
- Seamless interaction with integrated products and third-party software, such as Microsoft Excel® and Word®
- Continually updated in response to industry trends
- Supports COM/DCOM, OLE, OPC, and CAPE-OPEN, and generates reports in CSV and RTF
- Built for Intel-based PCs running Microsoft Windows®
- Requires minimal training
- User-customizable panes
- CHEMCAD Explorer pane to make navigating simulations easy
- Workspace to create and work with process flow diagrams (PFDs)
- Palette pane for easy drag and drop of unit operations, text, and symbols
- Message pane makes it easy to see diagnostics as you work with a simulation
- Toolbar makes common tasks easy to access
- Graphical plotting of results
- Tabular reports of results
- Use tabs to navigate or tile multiple windows
Day-to-Day Engineering Tasks
CHEMCAD helps solve basic calculations and complete daily tasks faster, increasing productivity.

Equipment Sizing
- Equipment sizing also available for:
  - Pumps
  - Safety Relief Devices
  - Column Trays and Packing

Thermophysical Property Calculations
- Heat Exchangers
- Vessels
- Piping/Valves - Pressure Drop/Line Sizing
- Bubble/Dew Points
- Data Regression
  - Pure Components
  - Binary Interaction Parameters
- Component Family Analyses

Small Projects
CHEMCAD streamlines processes used in smaller projects to improve work flow.

Troubleshooting / Process Improvement
- Reporting
  - Equipment/process costing
  - Process safety analyses
  - Regulatory compliance reports
  - Heat and material balance reporting
- Model potential customer systems in order to sell equipment and/or processes

Equipment Design
- Distillation with mass transfer calculation
- Relief system design/rating with DIERS
Large Projects
More extensive projects with several team members are made more efficient by CHEMCAD’s integrated modules and intuitive interface.

- Process development
  Fitting reaction kinetics from experimental data
  Direct lab experiments and pilot plant runs
  Scale up from lab to pilot and pilot to production

- Dynamic simulations
  Control system design/checkout
  Safety analyses

Integrated Solutions
CHEMCAD can be used as a pivotal player in very large, ongoing projects, working seamlessly with other software programs.

- Microsoft Visual Basic® for Applications
- Excel ‘wrappers’ for simulations
- Operator training systems

- Integrated solutions
  Process/plant performance monitoring
  Model predictive control
  Real-time optimizations
  CHEMCAD as the engine for other applications
The CHEMCAD suite includes six products that can be purchased individually or bundled as needed to accommodate specific industries, projects, and processes.

**CC-STEADY STATE**
Chemical process simulation software that includes libraries of chemical components, thermodynamic methods, and unit operations to allow steady-state simulation of continuous chemical processes from lab scale to full scale.

**Ideal for** → Users who want to design processes, or rate existing processes, in steady state.

**CC-DYNAMICS**
Process simulation software that takes steady-state simulations to the next level of fidelity to allow dynamic analysis of flowsheets. The possibilities are endless: operability check-out, PID loop tuning, operator training, even online process control and soft sensor functionality.

**Ideal for** → Users who want to design or rate dynamic processes.

**CC-THERM**
Heat exchanger design and rating software available as an add-on or standalone program. CC-THERM makes use of multiple international standards for design and materials to make sizing a heat exchanger faster and more accurate. The program covers shell-and-tube, plate-and-frame, air-cooled, and double-pipe exchangers. Rigorous designs are based on CHEMCAD’s foundation of physical property and phase equilibria data.

**Ideal for** → Users who want to design or rate a design by a vendor of a heat exchanger (single unit at a time), and those who want to rate existing exchangers in new service or perform “what if” calculations.

**CC-SAFETY NET**
Piping and safety relief network simulation software that allows rigorous analysis of any piping network. It combines the latest in two-phase relief device calculation, rigorous pressure drop calculation, rigorous physical property calculation, and rigorous phase equilibrium calculation to deliver fast, accurate answers.

**Ideal for** → Users who need to design or rate piping networks or safety relief devices/systems.

**CC-FLASH**
Physical properties and phase equilibria calculation software that is a subset of the CHEMCAD suite (all of the CHEMCAD suite products include CC-FLASH capabilities). This program allows rigorous calculation of physical properties and phase equilibria (VLE, LLE, VLLE) for pure components and mixtures.

**Ideal for** → Users who need physical property and phase equilibrium data, as well as users who need property prediction and regression.

**CC-BATCH**
Batch distillation simulation software that, when used as an add-on or standalone program, makes batch distillation simulation and design easy with intuitive, operation step-based input. CC-BATCH is extremely flexible, with many operating modes and the capability to model any number of operating steps and conditions. CC-BATCH optimizes batch operation, minimizes intermediate “slop” cuts, and increases productivity.

**Ideal for** → Users who want to design or rate a batch distillation column.

**CHEMCAD has a variety of applications, including:**
- Research and Development
- Project/Process Design
- Project/Process Redesign and Optimization
- Operations/Maintenance
- Safety and Hazard Analysis
- Environmental Study and Analysis
- Project and Product Sales
- Education

**CHEMCAD is commonly used in such industries as:**
- Exploration and Production
- Refining
- Commodity Chemicals
- Fine and Specialty Chemicals
- Pharmaceuticals
- Custom and Toll Manufacturing
- Engineering and Construction
- Consulting
- Process Equipment Manufacturing
- Power Plants
- Carbon Capture and Storage
- Alternative Fuels (Bioethanol, Biodiesel)
- Academic University Programs
CHEMCAD® modules, features, and unit operations

Here you will find a summary of features and properties of the CHEMCAD suite to allow you to find the modules that satisfy your requirements.

**Functionality**

- Design New Processes
- Model Existing Processes
- Optimize/Obtostanek Existing Processes
- HAZOP Analysis
- Environmental Analysis
- Process Expansion Modeling
- Economic Feasibility Studies
- Control System Design/Checkout
- Advanced Process Control
- Plant Data Reconciliation
- Operator Training Systems (OTS)
- Real Time Optimization (RTO)
- Process/Plant Performance Monitoring (PPM)
- Day-to-Day Engineering Calculations
- Equipment Design/Rating
- Process Development
- Utility System Design/Checkout

**Unit Operations**

- Distillation
- Shortcut and rigorous
- Simultaneous correction and rigorous inside out algorithms
- Three-phase distillation
- Mass transfer based distillation for packed and trayed columns
- Column autoconvergence
- Reactor distillation
- Batch distillation
- Dynamic distillation

- Reactors
- Stoichiometric
- Equilibrium
- Gibbs free energy minimization
- Kinetic (PFR or CSTR)
- Batch (CSTR) Reactor
- Heat exchanger
- Mixer

**Thermodynamics**

- Component separator
- Compressor/Expander (Turbine)
- Controller (Goal Seeker)
- Numerical controller similar to solver routine
- Control Valve
- Divider
- Flash
- Heat Exchanger
- UNIQUAC (UNIQUAC with the new group and surface parameter)
- UNIFAC/UNIFAC (UNIFAC with the old group and surface parameter)
- UNIFAC VLE
- UNIFAC LLE
- UFLM (UNFLM for Polymers)
- Wilson
- T. K. Wilson
- HRNM Modified Wilson
- Van Laar
- Non Random Two Liquid (NRTL)
- Margules
- GMAC (Chai-Nu)
- Scatchard-Hildebrand (Regular Solution)
- Wilson Salt
- Modified UNIFAC (Dortmund)
- Special Systems
- Amines (VLE and LLE) (AMINE)
- Sour Water (SOUR)
- Tri-Ethylene-Glycol/Water Dehydration (TEG Dehydration)
- Fox-Huggins Method for Polymers
- Mauro model for Formaldehyde - Methanol - Water systems
- User Supplied K-values
- Polynomal K-values
- Tabular K-values (USRK)
- Partial Pressures of Aqueous Mixtures (PPAQs) (Tabular Data)
- User Subroutine
- User-Specified Activity Coefficients (ACTX)
- Special Option Settings
- Vapor Phase Association
- Different K-value models and/or enthalpy models for different units or trays
- Different BIPs for different units or trays
- Vapor-Liquid and Vapor-Liquid-Liquid equilibrium
- Composite heat curve pinch analysis
- Distillation curve analysis
- Physical properties databank for pure components (DPPR)
- BIP database for activity coefficient equations
- Electrolytes database
- Vapor phase association database
- Interface to corporate and/or third-party databases
- Vapor fugacity or Pointing correction
- SRK and Peng-Robinson Alpha function and Boston-Mathias extrapolation option
- Henry components option
- Wilson model salt option
- User-customizable Binary Interaction Parameters
- Binary Interaction Parameters Regression
- Fill in missing BIPs using regression of UNIFAC with one click
- K-values
- Equations of State
- Soave-Redlich-Kwong (SRK)
- Grayson-Sreed Modified Chao-Soeder
- Peng-Robinson (PR)
- Benedict-Weeb-Rubin-Starling (BWRS)
- API Soave-Redlich-Kwong (API SRK)
- Modified Soave-Redlich-Kwong (MSRK)
- Extended Soave-Redlich-Kwong (ESRK)

**Activity Coefficient Methods**

- Margules
- Empirical
- Soave-Redlich-Kwong (SRK)
- Peng-Robinson-Stryjek-Vera (PRSV)
- ESSO (Maxwell-Bolomey)
- Ideal Vapor Pressure (Ideal Solution)
- Henry’s Law

**K-values**

- Margules
- Empirical
- Soave-Redlich-Kwong (SRK)
- Peng-Robinson-Stryjek-Vera (PRSV)
- ESSO (Maxwell-Bolomey)
- Ideal Vapor Pressure (Ideal Solution)
- Henry’s Law

**Special Option Settings**

- Vapor Phase Association
- Hydrocarbon/Water Solubility
- Vapor Fugacity/Pointing Correction
- Salt Effect (Dissolved Salts)
### Engineering advanced

#### 1.0** Engineering advanced

- Ethane/Ethyylene, Propane/Propylene special BPs
- Alpha Function Options
- Solid-Liquid Equilibrium
  - Predict solid-liquid equilibrium from melting point and heat of fusion
  - Allows study of solid-liquid and vapor-solid systems
- Model products based on assumption of a single solid state

#### 1.2** API Lu's Method

- Liquid Density Models
  - API
  - LESOU and Stal
  - Library
  - Two Term
  - Pressure Correction
  - Liquid Viscosity Mixing Rules
  - Log Average by Mass Fraction
  - Log Average by Mole Fraction
  - VBA
  - Log <= Mole % with Clark Correction
  - Log <= Mole % with Clark Correction
  - Vapor Density Model
  - Chapman-Enskog
  - Library
  - Thodos
  - Dean-Stie1 Pressure Correction
  - Liquid Surface Tension Models
  - API Procedure
  - Hydrocarbon Correlation
  - Library
  - Miller
  - Onsager Samaras (Electrolytes)
  - Liquid Thermal Conductivity Models
  - API Procedure
  - Hydrocarbon
  - Library
  - Radiation (Electrolytes)
  - Vapor Thermal Conductivity Models
  - API Procedure
  - Library
  - Vapor Conductivity Correlation (-1 atm)
  - No Correlation
  - API
  - Stal/Thodos
  - Custom
  - VBA
  - CAPE-OPEN Imported Transport Properties

#### 1.3** CAPE-OPEN imported transport property models

- Material properties
  - Constant
  - Temperature dependent
  - Compressed water pressure correction
  - Flashpoint
  - Solid-Liquid Equilibrium
  - Heat of solution
  - Heat of mixing by gamma
  - Heat of solution
  - Electrolyte enthalpy
  - Ideal gas heat capacity
  - Steam tables
  - Compressed water pressure correction
  - CAPE-OPEN imported enthalpy

#### 1.4** Transport Properties

- Solid-liquid properties
  - API
  - Library
  - Rackett
  - Liquid Density Mixing Rules

#### 1.5 Fluid Flow

- Flow properties
  - Bulk Properties
  - Phase Properties
  - Flow properties
  - Flow properties
  - Flow properties

#### 1.6** Physical Property Database

- Components
  - Over 2,000 pure components from DIPPR
  - User-customizable components
  - Group Contribution Estimation
  - UNIPAC
  - Joback
  - Methyl Ethers
  - Biodiesel
  - Edit Components
  - Property Regression
  - Electrolytes
  - Methods
  - Pitzer
  - mNRTL 1986 and 1982 electrolyte activity methods for strong and weak electrolytes including temperature-dependent interaction parameters
  - Binary and ternary interaction parameter database
  - Reaction equilibrium database including many common industrial systems, calculated from Gibbs free energy when data is absent
  - Expert system assistance for setting up electrolyte chemistry
  - True species conversion option
  - Electrolyte user database option
  - Option to consider electrolyte precipitate formation

#### 1.7 Flowsheeting

- Flowsheeting
  - Flowsheet Convergence
  - Steady State
  - Sequential modular convergence
  - Speed up methods (Wegstein, Dominant Errorvalue)
  - Simultaneous modular convergence
  - Flexible flowsheet tolerances
  - Optimization algorithm - maximize or minimize objective function given certain independent variables and constraints
  - Sensitivity and parametric analysis with reporting
  - Data maps to/from Excel
  - Unlimited size of flowsheet (unlimited number of streams and unit operations)
  - Run entire flowsheet, group of UnitOps, or a single UnitOp
  - Full dynamic flowsheeting for operability, training, startup/shutdown

### Tools

- Rigorous equipment sizing routines for:
  - Heat Exchangers
  - Shell and Tube
  - Design mode - geometry calculated from user constraints and desired performance
  - Rating mode - performance calculated from geometry
  - Fouling rating mode - fouling calculated from geometry and performance
  - Simulation mode - geometry used to calculate performance in a CHEMCAD simulation
  - Double Pipe
  - Design mode - geometry calculated from user constraints and desired performance
  - Rating mode - performance calculated from geometry
  - Fouling rating mode - fouling calculated from geometry and performance
  - Calculation of U-tube or straight tube double-pipe exchangers (sensible-to-sensible heat transfer only)
  - Allows multivariable arrangements
  - Plate and Frame
  - Design mode - geometry calculated from user constraints and desired performance
  - Rating mode - performance calculated from geometry and performance
  - Fouling rating mode - fouling calculated from geometry and performance
  - Air Coolant
  - Design mode - geometry calculated from user constraints and desired performance
Rating mode - performance calculated from geometry

Fouling rating mode - fouling calculated from geometry and performance

- Trays (Sieve, Bubble Cap, Valve)
- Packing (Random & Structured)
- Pipes
- Orifices
- Control Valves
- Three-Phase Vessels
- Safety Relief Devices (DIRS)
- Spec (specification) sheets in Microsoft Excel
- Costing/Economics
- Data Regression
- Pure component physical property regression
- Multicomponent VLE/LLE regression from user data, UNIFAC, or infinite dilution data
- Reaction rate regression from temperature, heat, and concentration data
- Data Reconciliation
- Vapor Venting/Depressuring
- EPA WAR Algorithm for environmental and health impact studies
- Hydrate/Solid CO2 Prediction
- Total Organic Content/Chemical Oxygen Demand Calculation
- Text Reports
- Available in
  - Internal text report viewer
  - Microsoft WordPad
  - Microsoft Word
  - Microsoft Excel
- Stream Compositions/Properties (Single/Multiple Streams or Groups)
- Particle Size Distribution
- Pseudo-Component Curves
- UnitOps (Single/Multiple Unit Operations or Groups)
- Spec Sheets
- Distillation
  - Column Profile
  - Tray Composition
  - Tray Properties
- Tower Mass Transfer
- Dynamic Column History
- Column Diagnosis
- Flowsheet Topology
- Flowsheet Thermodynamic Settings
- User Component Data
- Mass and Energy Balance
- Batch Results
- Dynamic Column/Stream/UnitOp Reports
- Full Consolidated Report of Simulation
- Charts
  - TPXY
  - Binodal
- Residue Curve Maps
- Binodal with Residue Curve Map Overlay
- Binary Liquid-Liquid Equilibrium
- Solid-Liquid Equilibrium
- Stream Properties
- Phase Envelopes
- Composite Curves
- Pseudo-Component Curves
- UnitOp Charts
- Dynamic Charts
- User Specified File chart
- Symbol Builder for Custom Graphic Representations
- Explorer Pane
- Unit Operations Palette
- Messaging Window
- Flowsheeting Window
- Help System
- E-mail simulations directly from CHEMCAD (using your e-mail client)
- Autosave system saves data at regular (user-specified) intervals and includes automatic file recovery at startup

Extensibility

- Licensed, embedded Microsoft Visual Basic for Applications (VBA) and Microsoft Visual Studio® Toolkit for Applications (VSTA) included in CHEMCAD
- OLE/COM/DCOM
- CAPE-OPEN Thermo Import
- OPC Data Server
- XML Export
- Licensing
  - 1, 3, & 5 year, monthly, and hourly licenses available
  - SafeNet SuperPro hardware keys (local and network)
  - SafeNet License Manager software key (network)
  - System Authorization software key (local)
To learn more about how CHEMCAD advances engineering, to request a free trial, or to find a distributor in your area, visit chemstations.com or call us at 1.800.CHEMCAD (243 6223) or +1 713.978.7700.