CHEMCAD Features, by Module

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
						Functionality
✓	✓	✓	✓	✓	✓	Design New Processes
✓	✓	✓	✓	✓	✓	Model Existing Processes
✓	✓	✓	✓	✓	✓	Optimize/Debottleneck Existing Processes
✓	✓	✓	✓	✓	✓	HAZOP Analysis
✓	✓			✓		DIERS Analysis
✓	✓	✓	✓	✓	✓	Environmental Analysis
✓	✓	✓	✓	✓	✓	Process Expansion modelling
✓	✓					Economic Feasibility studies
	✓			✓		Control System Design/Testing
	✓			✓		Advanced Process Control
✓	✓					Plant Data Reconciliation
✓	✓					Operator Training Systems (OTS)
	✓					Build CHEMCAD simulations which interact with any 3rd party HMI/SCADA/OTS interface as a rigorous, first principles-based simulated plant
	✓					Train on generic models or build CHEMCAD simulations that mimic your actual processes
✓	✓					Real Time Optimization (RTO)
✓	✓					Use CHEMCAD's internal optimizer or any proprietary/third party optimizer to improve plant performance based on results of CHEMCAD simulations
✓	✓					Open or closed loop operation
✓	✓					Process/Plant Performance Monitoring (PPM)
✓	✓					Monitor specific unit performance (heat exchanger fouling, distillation column efficiency, etc)
✓	✓					Display performance directly to operation staff on any HMI/SCADA display
✓	✓					Inferential / Soft sensor
✓	✓					Open or closed loop operation: use any PLC/DCS control loop interact directly with CHEMCAD variables
✓	✓	✓	✓	✓	✓	Day to Day Engineering Calculations
✓	✓	✓	✓	✓	✓	Physical/Thermophysical property calculations
✓	✓	✓	✓	✓		What ifs/Process Sensitivity/Process Scenarios
✓	✓	✓	✓	✓		Model Single Unit Operations or Groups of Unit Operations
✓	✓	✓	✓	✓		Equipment Design/Rating
✓	✓	✓	✓	✓		Process Development
✓	✓	✓	✓	✓		Lab Scale
✓	✓	✓	✓	✓		Pilot Scale
✓	✓	✓	✓	✓		Full Scale
✓	✓	✓	✓	✓		Scale Up between the above

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓	✓	✓	✓		Utility System Design/Testing
✓	✓	✓	✓	✓	✓	**Unit Operations**
✓	✓					Distillation
✓	✓					Shortcut and rigorous
✓	✓					Multiple column arrangements
✓	✓					Flexible specifications
✓	✓					Simultaneous Correction and Rigorous Inside Out algorithms
✓	✓					Support for more than 500 theoretical stages
✓	✓					Three phase distillation
✓	✓					Scrubbing and stripping
✓	✓					Mass transfer based distillation for packed and tray-ed columns
✓	✓					Automatically calculates the component diffusivities
✓	✓					Rigorous calculation of the mass transfer coefficient
✓	✓					User editable database of packing data from packing manufacturers
✓	✓					Calculation of ambient heat loss
✓	✓					Column Autoconvergence
✓	✓					Automatic estimation to assist column convergence option
✓	✓					Optimization for infeasible design specifications option
✓	✓					Column Diagnosis Report for unconverged columns
✓	✓					Pumparounds to move liquid flow to higher stages in a distillation column
✓	✓					Water Quench option to accelate calculation for Hydrocarbon-Water system
✓	✓					Total, Partial, Total with Decant and Partial with Decant condersers
✓	✓					Side strippers to draw liquid from one column stage and return vapor to a column stage above
✓	✓					Side Heat Exchangers option at any column location
✓	✓					Tray by tray tabular and plotted output
✓	✓					Reactive Distillation
✓	✓					Reactions may be equilibrium or kinetic equation based
✓	✓					Reactions solved simultaneously with VLE
✓	✓					Flexible rate form, including user added
✓	✓					Purity and temperature specifications
✓	✓					Up to 300 reactions
✓	✓					Vapor and/or liquid reactions are permitted
			✓			Batch Distillation
			✓			General Features:
			✓			Graphical plotting of time dependent results
			✓			Online, real-time display of results during calculation

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
			✓			Calculation interrupt
			✓			Full integration into the CHEMCAD Suite and flowsheets
			✓			Column Features:
			✓			Any number of operating steps
			✓			Up to 500 theoretical stages
			✓			Reservoir feeds
			✓			Side product accumulators
			✓			Stage heaters and coolers
			✓			Stage and condenser hold-ups (stage holdup profiles)
			✓			Simultaneous Correction and Rigorous Inside Out algorithms
			✓			Rigorous column sizing for trayed and packed columns available at the end of each operating step
			✓			Operating Step Options:
			✓			Startup from total reflux or from fixed liquid on all stages
			✓			Specifications may include a variety of options for the distillate, boil-up, reflux, condenser, and heat duties
			✓			Dump accumulators at any time
			✓			Add material at any time
			✓			Stop criterion may be based on the accumulator, distillate, residual charge, or time
			✓			User-defined pressure profile (linear or non-linear)
			✓			Alternate stop criteria permitted
✓						Dynamic Distillation
✓						Column Features:
✓						Can begin the simulation as a startup or from a steady-state condition
✓						Holdups can be:
✓						ignored
✓						constant or variable
✓						liquid and/or vapor
✓						specified in mass, molar or volumetric units
✓						specified for the condenser, reboiler, or any stages
✓						specified on each stage
✓						Pressure can be fixed or calculated
✓						Simulation can be performed using rigorous mass transfer analysis or using the equilibrium stage approach
✓						Packed columns can be calculated using rigorous mass transfer analysis or assuming equilibrium stages
✓						Multiple liquid phases
✓						Discrete event scheduler
✓						Pressure drop calculations included
✓						Reactive distillation allowed

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
	✓					Calculation of ambient heat loss
	✓					Start-up Features:
	✓					Dry or Wet tray startups
	✓					Fixed or variable pressure
	✓					May specify startup duration time and reboiler duty
	✓					Open or closed loop control simulation
	✓					Condenser Features:
	✓					Holdup can be:
	✓					Constant or variable
	✓					Specified in mass, mole or volume units
	✓					Set by a control valve
	✓					Reflux can be:
	✓					Specified in mass, mole or volume units
	✓					Set by a control valve
	✓					Distillate can be:
	✓					Specified in mass, mole, or volume units
	✓					Set by a control valve
	✓					Condenser U*A can be set; cooling fluid flow rates can be fixed or controlled
	✓					Condenser accumulator vessel specification options:
	✓					Orientation
	✓					Head type
	✓					Diameter and length
	✓					Initial liquid level
	✓					Reboiler Features:
	✓					Holdup can be variable or constant
	✓					Bottoms liquid product rate can be:
	✓					Specified in mass, mole, or volume units
	✓					Set by a control valve
	✓					Reboiler U*A can be set; heating fluid flow rates can be fixed or controlled
	✓					Reboiler vessel options:
	✓					Orientation
	✓					Head type
	✓					Diameter and length
	✓					Initial liquid level
	✓					Simulation Without Controllers:
	✓					Condenser/Reboiler specification options:

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
	✓					Reflux/Reboil ratio or rate
	✓					Heat duty
	✓					Temperature
	✓					Flow rate
	✓					Component flow rate
	✓					Purity
	✓					Recovery
	✓					Component recovery
	✓					Component ratios
	✓					Side product specification options:
	✓					Liquid or vapor flows
	✓					Liquid or vapor draw ratios
	✓					Complete stage information
	✓					Graphical and tabular time history for:
	✓					Condenser and reboiler
	✓					Any stage
✓	✓					Reactors
✓	✓					Can be specified adibatic, isothermal, and heat duty thermal mode
✓	✓					Stoichiometric
✓	✓					User can specify stoichiometric coefficients for up to 105 components
✓	✓					User can specify heat of reaction reference state (Ideal gas state or Liquid state)
✓	✓					Equilibrium
✓	✓					Unit calculates the Overall IG Heat of Reaction and the Overall Liquid Heat of Reaction
✓	✓					Up to 300 simultaneous reactions
✓	✓					User can specify reaction engineering units
✓	✓					Reversibility or no-reversibility convergence options
✓	✓					User can specify heat of reaction temperature reference
✓	✓					Reactor Model
✓	✓					General equilibrium reactor
✓	✓					Water-gas shift
✓	✓					Methanation
✓	✓					Calculation Mode
✓	✓					Parallel or inseries reaction conversions
✓	✓					Aproach temperature gradient
✓	✓					Aproach fraction
✓	✓					Kx or Ka liquid equilibrium models

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓					Gibbs free energy minimization
✓	✓					Unit calculates heat of reaction and lambda
✓	✓					Air/Oxygen calculation for combustion processes
✓	✓					Model solid conbustion
✓	✓					Inert specification
✓	✓					Allows vapor/mix or liquid only reaction phases
✓	✓					Kinetic (PFR or CSTR)
✓	✓					Allows liquid holdup calculations for dynamics simulation
✓	✓					Unit calculates Utility Temperature, Overall IG heat of reaction, and Overall Liquid Heat of Reaction
✓	✓					User can specify reaction engineering units
✓	✓					User can specify heat of reaction temperature reference
✓	✓					Unlimited simultaneous reactions
✓	✓					Flexible rate form, including user added
✓	✓					Reactor Model
✓	✓					Allows for Liquid, vapor or mixed phases reaction
✓	✓					User can specify PFR temperature profile
✓	✓					User can specify PFR utility
✓	✓					Option to specify actual reaction volume
✓	✓					Calculation modes
✓	✓					Specify volume to calculate conversion
✓	✓					Specify conversion to calculate volume
✓	✓					Specify utility flow (co-corrunt or countercurrent for a PFR)
	✓					Reactor Calculations:
	✓					Reactor Temperature
	✓					Reactor Pressure
	✓					Wall Temperature
	✓					Heat Rate
	✓					Reaction Heat Rate
	✓					Liquid Level
	✓					Overall Heat
	✓					Overall Heat of Reaction
	✓					Option to include compression and expansion effect
	✓					User can specify rate equation units
	✓					General Features
	✓					Graphical plotting of time dependent results
	✓					Graphical plotting of time calculated results

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
	✓					Display of results during calculation
	✓					Thermal Modes
	✓					Specify time vs. temperature profile
	✓					Specify jackets/coils
	✓					Specify time/heat duty profile
	✓					Specify vapor rate and pressure to calculate duty
	✓					Chemical Design
	✓					Unlimited number of species
	✓					Unlimited number of simultaneous reactions
	✓					Choice of Arrhenius, Langmuir-Hinshelwood, or user added rate equation forms
	✓					Regression of kinetic process data
	✓					Reactor Design
	✓					Multiple Coils and jackets
	✓					Service or process side heat exchangers and electric heaters
	✓					Heat transfer rate calculation; includes calculation of process and service side film coefficients
	✓					Vapor and liquid draws permitted
	✓					Batch, semi-batch or continuous operation
	✓					User specifed reactor holdup
	✓					Vessel pressurization calculated
	✓					Auxiliary Equipment
	✓					Other unit operations may be used with the batch reactor to flexibly model the process
	✓					Control System
	✓					User specified PID loops
	✓					Multiple ramp or step changes in setpoint
	✓					Control of reactor or jacket temperature differential
	✓					Level controllers
	✓					Pressure controllers
	✓					Cascade control
	✓					Heat-cool-chill system with safety interlocks
	✓					Split range controllers
	✓					Kinetic Data Regression
	✓					Can regress any combination of concentration, temperature volume and/or heat of reaction (Qr) data
	✓					Can fit multiple experiments in a single regression analysis
	✓					Can calculate the frequency factor, activation energy, component reaction order, Langmuir absorption parameters
	✓					Offers a variety of numerical methods to ensure that the regression is fast, accurate and can handle stiff systems
	✓					Accepts data from a wide range of calorimeters including the Mettler RC1 for which special features are provided

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
	✓					Graphical and tabular comparison of experimental and predicted results makes it easy for the user to evaluate the validity of the model
	✓					Diers Analysis Facility
	✓					Output
	✓					Graphical and tabular time history reports for:
	✓					Compositions
	✓					Pressure
	✓					Temperature
	✓					Heat of reaction
	✓					Utility flow rates
	✓					Liquid volume
	✓					Reaction mass physical properties
	✓					Rates of formation
	✓					Yields
	✓					Conversions
✓	✓					Calculator / Parser
✓	✓					User customizable unit operation
✓	✓					Allows use of C parser file to perform heat and mass balance for unit operation
✓	✓					User customizable input / output dialog
✓	✓					Flowsheet unit operations can interact with the unit operation results
✓	✓					Component separator
✓	✓					Black-box separator
✓	✓					Splits input stream into 2 output streams (Top annd bottom)
✓	✓					Different compositions and thermal conditions
✓	✓					User specified
✓	✓					Temperature
✓	✓					Buble Point Temperature
✓	✓					Dew Point Temperature
✓	✓					Degrees Subcooled
✓	✓					Degrees Superheat
✓	✓					Pressure Out
✓	✓					Pressure Drop
✓	✓					Split Basis
✓	✓					Split Fractions
✓	✓					Mass Flow Rates
✓	✓					Solids Split (Electrolytes Only)

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓					Split Destination
✓	✓					Specifications refer to top product
✓	✓					Specifications refer to bottom product
✓	✓			✓		Compressor / Expander (Turbine)
✓	✓			✓		Simulates isentropic or polytropic compression/expansion
✓	✓			✓		Mode of Operation
✓	✓			✓		Specify Outlet Pressure and Efficiency
✓	✓			✓		Specify Actual Work and Efficiency
✓	✓			✓		Specify Pout/Pin and Efficiency
✓	✓			✓		Specify Pressure Out and Actual Work
✓	✓			✓		Specify Pressure Out, Actual Work, and Efficiency
✓	✓			✓		Specify Permance Curves
✓	✓			✓		Calculation Option
✓	✓			✓		Fixed Flowrate, Calculate Pressure Out
✓	✓			✓		Pressure Out from Downstream UnitOp, Calculate Flowrate
✓	✓			✓		Unit
✓	✓			✓		Specify Head in Length Unit
✓	✓			✓		Specify Pressure Change
✓	✓			✓		Muliple Performance Curves
✓	✓			✓		Number of Speed Lines
✓	✓			✓		Actual RPM
✓	✓			✓		Property Option
✓	✓			✓		Inlet Conditions
✓	✓			✓		Average Inlet/Outlet
✓	✓			✓		Compressor/Expander Model Type:
✓	✓			✓		Adiabatic Compression
✓	✓			✓		Polytropic Compression
✓	✓			✓		Polytropic with Ideal Cp/Cv
✓	✓			✓		Cost Estimations
✓	✓			✓		Compressor Type
✓	✓			✓		Centrifugal Compressor
✓	✓			✓		Reciprocating Compressor
✓	✓			✓		Screw Compressor
✓	✓			✓		Driver Type
✓	✓			✓		Belt Drive Coupling
✓	✓			✓		Chain Drive Coupling

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓			✓		Variable Speed Drive Coupling
✓	✓			✓		Motor Type
✓	✓			✓		Open Drip-Proof
✓	✓			✓		Totally Enclosed, Fan Cooled
✓	✓			✓		Explosion Proof
✓	✓			✓		Motor RPM
✓	✓			✓		3600 RPM
✓	✓			✓		1800 RPM
✓	✓			✓		1200 RPM
✓	✓			✓		Insulation Factor
✓	✓			✓		Total Purchase Cost
✓	✓			✓		Total Installed Cost
✓	✓			✓		Utility Cost
✓	✓			✓		Purchase Cost Override
✓	✓			✓		Controller (Goal Seeker)
✓	✓			✓		Numerical controller similar to solver routine
✓	✓			✓		Modes
✓	✓			✓		Feed-Forward
✓	✓			✓		Set Stream or UnitOp Variable
✓	✓			✓		Equal to Stream or UnitOp Variable
✓	✓			✓		Add Stream or Equipment Variable
✓	✓			✓		Subtract Stream or Equipment Variable
✓	✓			✓		Multiply Stream or Equipment Variable
✓	✓			✓		Divide Stream or Equipment Variable
✓	✓			✓		Log (a)
✓	✓			✓		Exp (a)
✓	✓			✓		Power (a^b)
✓	✓			✓		Select Hi
✓	✓			✓		Select Low
✓	✓			✓		Discretize
✓	✓			✓		Inverval in Minutes
✓	✓			✓		Lag1
✓	✓			✓		Specify Gain
✓	✓			✓		Specify Lag Time
✓	✓			✓		Lead-Lag
✓	✓			✓		Specify Gain

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓			✓		Specify Lag Time
✓	✓			✓		Specify Lead Time
✓	✓			✓		Dead Time
✓	✓			✓		Feed-Backward
✓	✓			✓		Adjust Stream or UnitOp Variable
✓	✓			✓		Until Stream or UnitOp Variable
✓	✓			✓		Add Stream or Equipment Variable
✓	✓			✓		Subtract Stream or Equipment Variable
✓	✓			✓		Multiply Stream or Equipment Variable
✓	✓			✓		Divide Stream or Equipment Variable
✓	✓			✓		Log (a)
✓	✓			✓		Exp (a)
✓	✓			✓		Power (a^b)
✓	✓			✓		Select Hi
✓	✓			✓		Select Low
✓	✓			✓		Discretize
✓	✓			✓		Inverval in Minutes
✓	✓			✓		Lag1
✓	✓			✓		Specify Gain
✓	✓			✓		Specify Lag Time
✓	✓			✓		Lead-Lag
✓	✓			✓		Specify Gain
✓	✓			✓		Specify Lag Time
✓	✓			✓		Specify Lead Time
✓	✓			✓		Dead Time
✓	✓			✓		Equals
✓	✓			✓		Stream Variable
✓	✓			✓		Equipment Variable
✓	✓			✓		Constant
✓	✓			✓		Set to scale
✓	✓			✓		Control Valve
✓	✓			✓		Calculates flow rate through valve based on output signal from controller
✓	✓			✓		Especially useful for dynamic simulation with PID controller
✓	✓			✓		In Steady State, can calculate flow as function of position, or position as function of flow
✓	✓			✓		Handles compressible and incompressible flow
✓	✓			✓		Handles critical and sub-critical flow

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓			✓		Specify Valve Geometry
✓	✓			✓		Valve Flow Coefficient (Cv)
✓	✓			✓		Rangeability
✓	✓			✓		Critical Flow Factor
✓	✓			✓		Valve Type
✓	✓			✓		Equal Percentage Valve
✓	✓			✓		Linear Valve
✓	✓			✓		Specify Valve Curve
✓	✓			✓		Operating Mode
✓	✓			✓		Fix Flowrate, Adjust Valve Position
✓	✓			✓		Minimum Position %
✓	✓			✓		Maximum Position %
✓	✓			✓		Fix Valve Position, Adjust Flowrate
✓	✓			✓		Valve Position %
✓	✓			✓		Fix Flow and Position, Calculate Pressure Out
✓	✓			✓		Link to PID Controller
✓	✓			✓		User specified Static Head
✓	✓			✓		Supply Pressure
✓	✓			✓		Downstream Pressure calculation options (some depend on mode)
✓	✓			✓		calculate downstream pressure
✓	✓			✓		Specify downstream pressure
✓	✓			✓		Use pressure from a downstream unitop
✓	✓			✓		Ability to Force Forward Flow Only
✓	✓			✓		Ability to select Phase Model
✓	✓			✓		Allow Program to select
✓	✓			✓		Non-Flashing Liquid
✓	✓			✓		All Vapor
✓	✓			✓		Calculated Results
✓	✓			✓		Calculate Flow Rate
✓	✓			✓		Controller Output
✓	✓			✓		Stead State Position
✓	✓			✓		Controller Outpu in Steady State
✓	✓			✓		Controller Specifications
✓	✓			✓		Uses Equation Tv*(du/dt) = Av*P + Bv
✓	✓			✓		Specify Valve Tv
✓	✓			✓		Specify Valve Av

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓			✓		Specify Valve Bv
✓	✓			✓		Bias
✓	✓			✓		Valve Operation modes
✓	✓			✓		Normal
✓	✓			✓		Power Failure
✓	✓			✓		Manually Close
✓	✓			✓		Manually Open
✓	✓			✓		Manually Set Valve Position
✓	✓			✓		Optional Mass Flow Rate Transfer (send calculated flow rate to another unit operation)
✓	✓			✓		Specify Equipment ID
✓	✓			✓		Select Variable
✓	✓			✓	✓	Divider
✓	✓			✓	✓	Splits one stream into many streams
✓	✓			✓	✓	Outlet streams have same composition and intensive properties
✓	✓			✓	✓	Split flows based on
✓	✓			✓	✓	Flow ratio
✓	✓			✓	✓	Molar flow rate
✓	✓			✓	✓	Back-calculated feed rate
✓	✓			✓	✓	Mass flow rate
✓	✓			✓	✓	Flow units defined below (user-specified)
✓	✓					Excel Unit
✓	✓					User customizable unit operation using a Microsoft Excel spreadsheet as a unit operation
✓	✓					Allows use of Excel VBA for additional customization with access to CHEMCAD function libraries
✓	✓					User customizable input / output dialog
✓	✓					Flowsheet unit operations can interact with the unit operation results
✓	✓					Fired heater
✓	✓					Calculates fuel usage required to heat process stream to specified temperature
✓	✓					Heating value of fuel gas can be input by user (default 900 BTU/scf)
✓	✓					If calc. heat duty to heat stream > rated heat duty of heater, output T of stream is reduced accordingly
✓	✓					Option for phase separation (multiple outlets)
✓	✓					Specify temperature out
✓	✓					Optional inputs
✓	✓					Pressure drop
✓	✓					Rated heat duty
✓	✓					Fuel heating value
✓	✓					Thermal efficiency

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓					Calculated Results
✓	✓					Heat absorbed
✓	✓					Fuel usage
✓	✓					Cost Estimations
✓	✓					Type
✓	✓					Box type
✓	✓					Process heater
✓	✓					Pyrolysis
✓	✓					Reformer without catalysis
✓	✓					Cylindrical type
✓	✓					Cylidrical
✓	✓					Dowtherm
✓	✓					Tube material
✓	✓					Carbon steel
✓	✓					CrMo steel
✓	✓					Stainless
✓	✓					Design pressure
✓	✓					Installation factor
✓	✓					Calculated Cost
✓	✓					Pruchase Cost
✓	✓					Installed Cost
✓	✓					Utility Cost
✓	✓					Purchase Cost Override
✓	✓			✓	✓	Flash
✓	✓			✓	✓	Phase options for separation
✓	✓			✓	✓	Vapor-Liquid
✓	✓			✓	✓	Vapor-Liquid-Liquid
✓	✓			✓	✓	Liquid-Liquid
✓	✓			✓	✓	Isothermal
✓	✓			✓	✓	Adiabatic
✓	✓			✓	✓	Isentropic
✓	✓			✓	✓	Multiple inputs
✓	✓			✓	✓	Multiple Outputs
✓	✓			✓	✓	Modes
✓	✓			✓	✓	Use inlet T and P; calculate V/F and Heat
✓	✓			✓	✓	Specify V/F and P; calculate T and Heat

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓			✓	✓	Specify T and P; calculate V/F and Heat
✓	✓			✓	✓	Specify T and H; calculate V/F and P
✓	✓			✓	✓	Specify V/F and T; calculate P and Heat
✓	✓			✓	✓	Specify P and H; calculate V/F and T
✓	✓			✓	✓	Specify P; isentropic flash
✓	✓			✓	✓	Specify T; isentropic flash
✓	✓			✓	✓	Specify P; water dew point T (H_2O/HC)
✓	✓			✓	✓	Specify T; water dew point P (H_2O/HC)
✓	✓			✓		Cost Estimations
✓	✓			✓		Specify
✓	✓			✓		Type
✓	✓			✓		Horizontal Pressure Vessel
✓	✓			✓		Vertical Pressure Vessel
✓	✓			✓		Storage Tank
✓	✓			✓		Diameter
✓	✓			✓		Length
✓	✓			✓		Vessel Thickness
✓	✓			✓		Head Thickness
✓	✓			✓		Straight Flange
✓	✓			✓		Head Type
✓	✓			✓		Ellipsoidal
✓	✓			✓		Hemispherical
✓	✓			✓		Bumped (F and D)
✓	✓			✓		Flat
✓	✓			✓		Vessel Material
✓	✓			✓		Carbon Steel
✓	✓			✓		Stainless steel 304
✓	✓			✓		Stainless steel 316
✓	✓			✓		Carpenter 20CB-3
✓	✓			✓		Nickel 200
✓	✓			✓		Monel 400
✓	✓			✓		Inconel 600
✓	✓			✓		Incoloy 825
✓	✓			✓		Titanium
✓	✓			✓		Metal Density
✓	✓			✓		Storage tank material

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓			✓		Carbon Steel
✓	✓			✓		Stainless steel 316
✓	✓			✓		Stainless steel 304
✓	✓			✓		Stainless steel 347
✓	✓	✓		✓		Heat exchanger
✓	✓	✓		✓		Simple Heat Exchanger
✓	✓	✓		✓		Modeled by Q=U*A*LMTD
✓	✓	✓		✓		Can specify pressure drop
✓	✓	✓		✓		Design mode - specify 1 of the following
✓	✓	✓		✓		Temperature of stream in
✓	✓	✓		✓		Vapor Fraction of stream in
✓	✓	✓		✓		Subcooling for stream in
✓	✓	✓		✓		Superheat for stream in
✓	✓	✓		✓		Heat Duty
✓	✓	✓		✓		Change in temperature of streams
✓	✓	✓		✓		Backcalculate Mode (for Autocalc)
✓	✓	✓		✓		None
✓	✓	✓		✓		Scale Process Inlet Stream
✓	✓	✓		✓		Calculate Inlet Process Temperature
✓	✓	✓		✓		Calculated Heat Duty
✓	✓	✓		✓		LMTD (End Points)
✓	✓	✓		✓		LMTD Correction Factor
✓	✓	✓		✓		Utility flow rate
✓	✓	✓		✓		Specify Utility Heat Value
✓	✓	✓		✓		Utility Rating Mode
✓	✓	✓		✓		Temperature 2 in
✓	✓	✓		✓		Temperature 2 out
✓	✓	✓		✓		Overall U
✓	✓	✓		✓		Area/shell
✓	✓	✓		✓		Shells in series
✓	✓	✓		✓		Number of SS passes
✓	✓	✓		✓		Number of TS passes
✓	✓	✓		✓		Include Holdup
✓	✓			✓		Cost Estimations
✓	✓			✓		Cost Model
✓	✓			✓		Shell and tube

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓			✓		Fixed Head
✓	✓			✓		Kettle Reboiler
✓	✓			✓		U tube
✓	✓			✓		Meterial
✓	✓			✓		Carbon steel
✓	✓			✓		Stainless steel 316
✓	✓			✓		Stainless steel 304
✓	✓			✓		Stainless steel 347
✓	✓			✓		Nickel 200
✓	✓			✓		Monel 400
✓	✓			✓		Inconel 600
✓	✓			✓		Incoloy 825
✓	✓			✓		Titanium
✓	✓			✓		Hastelloy
✓	✓			✓		Evaporators
✓	✓			✓		Forced circulation
✓	✓			✓		Shell/Tube = Steel/copper
✓	✓			✓		Shell/Tube = Monel/cupronickel
✓	✓			✓		Shell/Tube = Nickel/Nickel
✓	✓			✓		Long tube
✓	✓			✓		Shell/Tube = Steel/copper
✓	✓			✓		Shell/Tube = Steel/steel
✓	✓			✓		Shell/Tube = Steel/aluminum
✓	✓			✓		Shell/Tube = Nickel/Nickel
✓	✓			✓		Falling Film
✓	✓			✓		assumes carbon steel shell, stainless 316 internals
✓	✓			✓		Air Coolers
✓	✓			✓		Refrigeration
✓	✓			✓		Double Pipe
✓	✓			✓		Shell/Tube = Cs/Cs
✓	✓			✓		Shell/Tube = Cs/304L stainless
✓	✓			✓		Shell/Tube = Cs/316 stainless
✓	✓			✓		Area
✓	✓			✓		Design Pressure
✓	✓			✓		install Factor
✓	✓			✓		Material Factor

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓			✓		Pressure Factor
✓	✓			✓		Type Factor
✓	✓			✓		Calculated Results
✓	✓			✓		Basic cost
✓	✓			✓		Total purchase cost
✓	✓			✓		Total installed cost
✓	✓			✓		Utility Cost
✓	✓			✓		Purchase Cost Override
		✓				Two Sided Heat Exchnager
		✓				Design Case
		✓				Rating Case
		✓				Utility
		✓				Calculation Mode
		✓				CHEMCAD simulation
		✓				Backcalc mode (for Autocalc)
		✓				Utility Option
		✓				Off
		✓				Calculate Flow of stream 1
		✓				Calculate Flow of stream 2
		✓				Specifications
		✓				Temperature of hot stream out
		✓				Temperature of cold stream out
		✓				Vapor fraction of hot stream out
		✓				Vapor fraction of cold stream out
		✓				Subcooling hot stream out
		✓				Subcooling cold stream out
		✓				Superheat hot stream out
		✓				Superheat cold stream out
		✓				Heat duty
		✓				minimum change in temperature
		✓				hot outlet - cold inlet
		✓				hot inlet - cold outlet
		✓				difference between both streams out
		✓				difference between in & out streams
		✓				Heat transfer coefficient (U)
		✓				Area (per shell)

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
		✓				pressure drop
		✓				Type
		✓				Counter current
		✓				Evaporator
		✓				Cocurrent
		✓				Specifications
		✓				P1 out
		✓				P2 out
		✓				Number of zones
		✓				Shells in series
		✓				No of SS passes
		✓				No of TS passes
		✓				include holdup in dynamic calculation
		✓				1st side holdup
		✓				2nd side holdup
		✓				Utility operating T (evaporator)
		✓				Calculated Results
		✓				heat duty
		✓				LMTD (end points)
		✓				LMTD corr Factor
		✓				U
		✓				Area (per shell)
		✓				Tube fouling
		✓				Shell fouling
		✓				Pinch flag
		✓				Wt. LMTD
		✓				Area (zone analysis)
		✓				Str1 Pout
		✓				Str2 Pout
		✓				Shell & Tube simulation
		✓				Shell & Tube fouling factor rating
		✓				Plate Exchanger fouling factor rating
		✓				Double Pipe Simulation
		✓				Double Pipe Fouling Factor Rating
✓	✓					LNG Heat exchanger (multi stream exchanger)
✓	✓					Used to simulate exchange of heat between multiple hot & cold streams

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓					Specifications
✓	✓					Pressure drop
✓	✓					Temperature of outlet streams
✓	✓					Vapor fraction of outlet streams
✓	✓					heat Duty
✓	✓					Superheat of outlet streams
✓	✓					Subcool of outlet streams
✓	✓					Temperature difference of inlet stream and outlet stream
✓	✓					Calculated
✓	✓					Duty
✓	✓					Overall Heat Duty
✓	✓					Loop
✓	✓					Used to execute a given sequence of UnitOps run until a convergence tolerance is reached
✓	✓					Possible to run large simulation with easy convergence
✓	✓					Can run small subset of flowsheet at tighter convergence tolerance
✓	✓					Convergence tolerances
✓	✓					Flow rate
✓	✓					Temperature
✓	✓					Pressure
✓	✓					Vapor Fraction
✓	✓					Enthalpy
✓	✓					Iterations
✓	✓					Specify up to 50 UnitOps
✓	✓					Meta
✓	✓					Link another flowsheet as a unit operation for nesting large or commonly used simulations
✓	✓					Use for Sub-Flowsheet functionality
✓	✓					User can map streams from current flowsheet to streams from the embedded flowsheet (up to 13 inlets and 13 outlets)
✓	✓					Can run all UnitOps or a specific group of UnitOps in the embedded flowsheet
✓	✓					Unlimited nesting of simulations
✓	✓			✓	✓	Mixer
✓	✓			✓	✓	Mix up to 13 streams and up to 2 outlets
✓	✓			✓	✓	Performs adiabatic flash calculation at outlet pressure of mixer
✓	✓			✓	✓	If more than one output stream is entered, the mixer serves as phase separator
✓	✓			✓		Node
✓	✓			✓		Allows simultaneous flow and pressure calculations throughout the flowsheet for hydraulic calculations
✓	✓			✓		Unit modes:

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓			✓		Variable Pressure
✓	✓			✓		Fixed Pressure
✓	✓			✓		For variable pressure, maximum and minimum pressure may be set
✓	✓			✓		Elevation may be set for static head calculations
✓	✓			✓		Up to five inlets and five outlets can be used
✓	✓			✓		Stream modes:
✓	✓			✓		Fixed Mole Rate
✓	✓			✓		Fixed Mass Rate
✓	✓			✓		Fixed Volume Rate
✓	✓			✓		Flow set by Unit Op
✓	✓			✓		Free inlet/outlet stream
✓	✓			✓		Use current stream rate
✓	✓					Phase Generator
✓	✓					Does a series of flash calculations in a range of user-specified operating conditions
✓	✓					Results show temperature, pressure, total mass balance, energy balance, compressibility factors of the vapor and liquid products
✓	✓					Specify flash mode, lower/upper bounds of flash parameters, and number of desired flash points
✓	✓					User Specified
✓	✓					Vapor Fraction and Pressure, calculate Temperature and Heat
✓	✓					Temperature and Pressure, calculate Vapor Fraction and Heat
✓	✓					Temperature, adiabatic flash
✓	✓					Vapor Fraction and Temperature, calculate Pressure and Heat
✓	✓					Pressure, adiabatic flash
✓	✓					Pressure, isentropic flash
✓	✓					Temperature, isentropic flash
✓	✓					Pressure, water dew point temperature (H_2O/HC)
✓	✓					Temperature, water dew point pressure (H_2O/HC)
✓	✓			✓		Pipe simulator
✓	✓			✓		Fluid Flow Methods
✓	✓			✓		Darcy-Weisbach Equation - for single phase flow either compressible or incompressible
✓	✓			✓		Baker Method - For two-phase flow; determines if the flow is dispersed, bubble, slug, stratified, plug, annular, or wave flow and applies appropriate equation
✓	✓			✓		Beggs and Brill Method - For two-phase flow; identifies flow as segregated, intermittent, distributed, or transition flow to select correct equation parameters
✓	✓			✓		Isothermal flow equation - For long distance transmition lines
✓	✓			✓		Hazen-Williams equation - For water sprinkler fire protection systems
✓	✓			✓		Fritzsche equation - Pressure-drop formula for steam systems
✓	✓			✓		Critical flow - Critical flow of compressible fluids is always detected and reported; at the user's option, it will limit flow
✓	✓			✓		Slurry (solid +liquid) - Considers the effect of suspend solid components on pressure drop

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓			✓		User-added pipe models - User-specified pressure drop fluid flow method, which can be written in Visual C language
✓	✓			✓		Sizing options
✓	✓			✓		Rating - User specifies pipe size; the program calculates outlet pressure based on pipe size, flow rate, and inlet pressure
✓	✓			✓		Design: Single phase flow - Pipe size calculation for either liquid or gases
✓	✓			✓		Design based on Dp/100ft - Single-phase flow designs based on pressure drop per 100 ft
✓	✓			✓		Design, Two-phase vertical flow - For the calculation of the optimum pipe diameter when flow is two-phase and vertical
✓	✓			✓		Given size and Pout, backcalc. Pin - The program back calculates inlet pressure (meant for Auto Calc mode only)
✓	✓			✓		Given size, Pin and Pout, calc flowrate - User specifies pipe size and inlet/outlet pressure, and the program calculates flow rate
✓	✓			✓		Design based on velocity - Diameter is calculated based on user-specified velocity
✓	✓			✓		User-specified pipe elevation option
✓	✓			✓		Jain or Churchill friction factor models
✓	✓			✓		User-specified number of segments - for multiple segement pipelines
✓	✓			✓		User-specified roughness factor or pipe material
✓	✓			✓		Include holdup in dynamic simulation option
✓	✓			✓		Gas expansion consideration option
✓	✓			✓		Valves - A library of valves is provided
✓	✓			✓		Fittings and elbows - A library of fittings and elbows is provided
✓	✓			✓		User-specified fiitings/valves - Flow resistance may be entered as L/D, Kr, Ks, or 3K (Darby) method
✓	✓			✓		Commercial pipe schedules built into the program
✓	✓			✓		Heat Transfer consideration
✓	✓			✓		Thermal modes:
✓	✓			✓		Adiabatic
✓	✓			✓		Isothermal
✓	✓			✓		Heat Transfer to ambient
✓	✓			✓		User-specified ambient conditions and pipe wall conditions
✓	✓			✓		User-specified number of insulation layers
✓	✓			✓		PID Controller
✓	✓			✓		PID (proportional - integral - derivative) action can be specified
✓	✓			✓		Controller set points can be purity, temperature, pressure, level, flow, or any other flowsheet variable
✓	✓			✓		Controller limits may be set:
✓	✓			✓		With or without upper or lower limits
✓	✓			✓		Relative to the set point
✓	✓			✓		At a specified value
✓	✓			✓		Cascade and split range controllers can be used
✓	✓			✓		Sensor functions can be specified
✓	✓			✓		Controller action can be specified as direct or indirect

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓			✓		Measured object can be stream or unit operations
✓	✓			✓		Controller Limit options - Limits put dead band into controller response
✓	✓			✓		RAMP Controller
✓	✓			✓		Change various operating parameters with respect to time
✓	✓			✓		In Dynamics, can be used to simulate operator functions (such as opening valve at time = t)
✓	✓			✓		Manipulate stream or UnitOp variables
✓	✓			✓		Input Time and value
✓	✓			✓		Input Time and use random disturbance (set min and max)
✓	✓			✓		Use Sine wave
✓	✓			✓		Input Offset c
✓	✓			✓		Input Period
✓	✓			✓		Input Baseline
✓	✓			✓		Input Amplitude
✓	✓			✓		Pump
✓	✓			✓		Unit calculates power and head
✓	✓			✓		On/Off Operating mode
✓	✓			✓		Calculation mode
✓	✓			✓		Specify outlet pressure
✓	✓			✓		Specify pressure increase
✓	✓			✓		Specify Characteristic equation
✓	✓			✓		Specify performance curve
✓	✓			✓		Performance curve options
✓	✓			✓		Allows for a fixed flow rate to calculate outlet pressure
✓	✓			✓		Allows use of outlet pressure from downstream UnitOp to calculate flow rate
✓	✓			✓		Special Option
✓	✓			✓		NPSHa calculations
✓	✓					Cost Estimation
✓						Recorder
✓						Records stream information as a function of the number of recycle iterations
✓						Can be used in dynamic simulations to record information as a function of time
✓						Can be used to diagnose recycle loop convergence problems
✓						Records inlet stream information to a file each time calculation is passed through it; writes the inlet stream to the outlet stream
✓	✓					Stream reference
✓	✓					Transfer process stream information to other stream
✓	✓					Internal distillation streams can be transferred to simulate heat integrated process
✓	✓					Output stream is exact as input stream

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓					Mode
✓	✓					Reference from stream to stream
✓	✓					Transfer all stream properties
✓	✓					Transfer component and total flowrates only
✓	✓					Transfer stream enthalpy only
✓	✓					Reference from column to external stream
✓	✓					Stage number
✓	✓					Phase option
✓	✓					Pass Heat Exchanger duty to column inlet (HX) stream
✓	✓					Pass Pumparound draw to external stream
✓	✓					Pass stream to batch column/reactor pot charge
✓	✓					Scale
✓	✓					Fixed flow rate
✓	✓					User Added Module
✓	✓					User-customizable unit operation using a .DLL file created by the user for ultimate customization
✓	✓					Allows use of C++ with access to CHEMCAD function libraries
✓	✓					User customizable input / output dialog
✓	✓					Flowsheet unit operations can interact with the unit operation results
✓	✓					Faster calculation times compared with Excel unit operations
✓	✓			✓		Valve
✓	✓			✓		Performs adiabatic flash at output pressure on input stream
✓	✓			✓		Specify either
✓	✓			✓		outlet pressure
✓	✓			✓		pressure drop
✓	✓			✓		dew point temperature
✓	✓			✓		bubble point temperature
✓	✓			✓		Serves as phase separator if more than one output stream specified
✓	✓			✓		Can be set to closed
✓	✓					Vessel
✓	✓					Used as a comination of flash drum with divider
✓	✓					Allows the vapor and liquid phases to be separated
✓	✓					Allows the liquid to be split among several outlets
✓	✓					Can have two liquid phases
✓	✓					Mode
✓	✓					Use inlet T and P; calculate V/F and Heat
✓	✓					Specify V/F and P; calculate T and Heat

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓					Specify T and P; calculate V/F and Heat
✓	✓					Specify T and H; calculate V/F and P
✓	✓					Specify V/F and T; calculate P and Heat
✓	✓					Specify P and H; calculate V/F and T
✓	✓					Specify P; isentropic flash
✓	✓					Specify T; isentropic flash
✓	✓					Specify P; water dew point T (H_2O/HC)
✓	✓					Specify T; water dew point P (H_2O/HC)
✓	✓					Split based on
✓	✓					Flow ratio
✓	✓					Molar flow rate
✓	✓					Back-calculate feed rate
✓	✓					Mass flow rate
✓	✓					Flow units defined
✓	✓					Solids handling:
✓	✓					Baghouse filter
✓	✓					Simulate and rate operations of standard filter dust collector
✓	✓					Calculation of efficiency, pressure drop, flow through the dust bed, time of residency, number of cells and gas velocity
✓	✓					User-specified Performance Table: Particle size vs. efficiency table
✓	✓					Centrifugal filter
✓	✓					Calculation of height, input flow rate, cake radius ration, and cake radius ratio
✓	✓					Cost estimation option
✓	✓					Crusher/Grinder
✓	✓					Work, size reduction and solid mass flow calculation by three different type of crushers:
✓	✓					Jaw and primary-gyratory crushers
✓	✓					Reduction-gyratory and cone crushers
✓	✓					Roller crushers
✓	✓					User-specified D80 (square-mesh aperture that passes 80% of the material) and crusher PSD function
✓	✓					Cost estimation option
✓	✓					Outlet particle size distribution calcualtion
✓	✓					Crystallizer
✓	✓					Simulates crystallization for liquid-solid or vapor-liquid-solid phases and melting processes by cooling or heating
✓	✓					Calculation of Temperature, Heat Duty and Vaporization
✓	✓					User specified crystallization stoichiometry and solubility table
✓	✓					Cyclone
✓	✓					Module for the design or rating of gas-liquid cyclone separator

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓					Calculation of cyclone dimension, pressure drop and overall efficiency
✓	✓					Two cyclone methods options available: Koch and Linch and Rosen, Rammler, Intelmann method
✓	✓					Dryer
✓	✓					Simulates the material and energy balance associated with general drying process
✓	✓					Vapor flow and final vapor pressure calculation
✓	✓					Electrostatic precipitator
✓	✓					Module for the design or rating of electrostatic precipitator to collect small dust particles from gas streams
✓	✓					For rating mode user specifies area and program calculates efficiency
✓	✓					For design mode user specifies overall efficiency and program calculates area of the precipitator
✓	✓					User-specified charging field, collecting field, and pressure drop
✓	✓					Hydrocyclone
✓	✓					Simulating or designing a hydrocyclone to separate solids in a liquid stream by either of two methods: Dahlstrom or Bradley
✓	✓					Rating pressure drop and calculating efficiency of the equipment
✓	✓					Design cyclone dimensions
✓	✓					Screen
✓	✓					Simulates screening processes by either a separation formula or an efficiency table
✓	✓					Efficiency calculation
✓	✓					Cost estimation option
✓	✓					Sedimentator
✓	✓					Separates solids from liquid slurry
✓	✓					User-specified height, diameter, liquid radius ratio, and speed; CHEMCAD calculates moisture fraction and overall efficiency
✓	✓					Vacuum filter
✓	✓					Can simulate or design either a vacuum or a constant-pressure filter
✓	✓					Three types of filter: rotary drum, general constant pressure, or simple material balance
✓	✓					Pressure drop, filter area, and input flow rate calculation
✓	✓					User-specified cake characteristics: specific resistance, compressibility, moisture fraction, and solid loss fraction
✓	✓					User-specified optional cake properties: particle size, sphericity, cake porosity, and shape constant
✓	✓					Cost estimation option
✓	✓					Venturi scrubber
✓	✓					Precipitates particulates, fogs, and condensable vapors from gas streams, and will partition the particulates between the liquid and vapor outlet streams
✓	✓					Treats the liquid-vapor contact as an equilibrium system
✓	✓					For rating efficiency is calculated
✓	✓					For designing flow rate of the liquid stream is calculated
✓	✓					Washer
✓	✓					Mass and energy balance for washing wet solids with solvent
✓	✓					User specification for mixing efficiency, solid loss fraction, and liquid-solid ratio

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓					Adiabatic, Isothermal, and Heat Duty -Temperature mode options
✓	✓					Custom
✓	✓					Microsoft Excel spreadsheet unit
✓	✓					.DLL generated from C++
✓	✓					Visual Basic internal VBA
✓	✓	✓	✓	✓	✓	**Thermodynamics**
✓	✓	✓	✓	✓	✓	General
✓	✓	✓	✓	✓	✓	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
✓	✓	✓	✓	✓	✓	Physical properties estimation of undefined components: group contribution methods available for pure and mixture properties estimation
✓	✓	✓	✓	✓	✓	Composite heat curve pinch analysis
✓	✓	✓	✓	✓	✓	Distillation curve assay analysis
✓	✓	✓	✓	✓	✓	Physical properties databank for pure components (DIPPR)
✓	✓	✓	✓	✓	✓	BIP database for activity coefficient equations
✓	✓	✓	✓	✓	✓	Electrolytes database
✓	✓	✓	✓	✓	✓	Vapor phase association database
✓	✓	✓	✓	✓	✓	Interface to corporate and/or third party databases
✓	✓	✓	✓	✓	✓	Vapor Fugacity or Poynting Correction for pressure of the vapor phase when using activity coefficient models
✓	✓	✓	✓	✓	✓	SRK and Peng Robinson Alpha function and Boston Mathias extrapolation option
✓	✓	✓	✓	✓	✓	Water-Hydrocarbon solubility which accounts for the miscibility or immiscibility of water in the system
✓	✓	✓	✓	✓	✓	Henry components option to select components that are to be modeled by Henry's Gas Law K-Value
✓	✓	✓	✓	✓	✓	Wilson model salt option which accounts for the effect of dissolved salts on the vapor-Liquid Equilibrium of solvents
✓	✓	✓	✓	✓	✓	User-customizable Binary Interaction Parameters
✓	✓	✓	✓	✓	✓	Binary Interaction Parameters Regression
✓	✓	✓	✓	✓	✓	Component properties regression: Antoine vapor pressure, Library vapor pressure, Heat of vaporization, Liquid density
✓	✓	✓	✓	✓	✓	Liquid and Vapor viscosity, Liquid and Vapor thermal conductivity, Liquid surface tension, Polynomial and Library Ideal gas heat capacity
✓	✓	✓	✓	✓	✓	Fill in missing BIPs using regression of UNIFAC with one click
✓	✓	✓	✓	✓	✓	K-Values
✓	✓	✓	✓	✓	✓	Equations of State
✓	✓	✓	✓	✓	✓	Soave-Redlich-Kwong (SRK)
✓	✓	✓	✓	✓	✓	Grayson-Streed Modified Chao-Seader
✓	✓	✓	✓	✓	✓	Peng-Robinson (PR)
✓	✓	✓	✓	✓	✓	Benedict-Webb-Rubin-Starling (BWRS)
✓	✓	✓	✓	✓	✓	API Soave-Redlich-Kwong (API SRK)

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓	✓	✓	✓	✓	Modified Soave-Redlich-Kwong (MSRK)
✓	✓	✓	✓	✓	✓	Extended Soave-Redlich-Kwong (TSRK)
✓	✓	✓	✓	✓	✓	Predictive Soave-Redlich-Kwong (PSRK)
✓	✓	✓	✓	✓	✓	Elliott Suresh Donohoe (ESD)
✓	✓	✓	✓	✓	✓	Statistical Associating Fluid Theory (SAFT)
✓	✓	✓	✓	✓	✓	Peng-Robinson-Stryjek-Vara (PRSV)
✓	✓	✓	✓	✓	✓	Empirical
✓	✓	✓	✓	✓	✓	ESSO (Maxwell-Bonnell)
✓	✓	✓	✓	✓	✓	Ideal Vapor Pressure (Ideal Solution)
✓	✓	✓	✓	✓	✓	Henry's Gas Law
✓	✓	✓	✓	✓	✓	Activity Coefficient Methods
✓	✓	✓	✓	✓	✓	UNIQUAC (UNIQUAC with the new group and surface parameters)
✓	✓	✓	✓	✓	✓	UNIFAC/UNIQUAC (UNIQUAC with the old group and surface parameters)
✓	✓	✓	✓	✓	✓	UNIFAC VLE
✓	✓	✓	✓	✓	✓	UNIFAC LLE
✓	✓	✓	✓	✓	✓	UPLM (UNIFAC for Polymers)
✓	✓	✓	✓	✓	✓	Wilson
✓	✓	✓	✓	✓	✓	T. K. Wilson
✓	✓	✓	✓	✓	✓	HRNM Modified Wilson
✓	✓	✓	✓	✓	✓	Van Laar
✓	✓	✓	✓	✓	✓	Non-Random Two Liquid (NRTL)
✓	✓	✓	✓	✓	✓	Margules
✓	✓	✓	✓	✓	✓	GMAC (Chien-Null)
✓	✓	✓	✓	✓	✓	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)
✓	✓	✓	✓	✓	✓	Flory-Huggins Method for Polymers
✓	✓	✓	✓	✓	✓	Maurer model for Formaldehyde - Methanol - Water systems
✓	✓	✓	✓	✓	✓	User Supplied K-Values
✓	✓	✓	✓	✓	✓	Polynomial K-values
✓	✓	✓	✓	✓	✓	Tabular K-values (USRK)
✓	✓	✓	✓	✓	✓	Partial Pressures of Aqueous Mixtures (PPAQ) (Tabular Data)

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓	✓	✓	✓	✓	User Subroutine
✓	✓	✓	✓	✓	✓	User Specified Activity Coefficients (ACTX)
✓	✓					User Visual C VLE compile program (ADDK)
✓	✓	✓	✓	✓	✓	Special Option Settings
✓	✓	✓	✓	✓	✓	Vapor Phase Association
✓	✓	✓	✓	✓	✓	Hydrocarbon/Water Solubility
✓	✓	✓	✓	✓	✓	Vapor Fugacity/Poynting Correction
✓	✓	✓	✓	✓	✓	Salt Effect (Dissolved Salts)
✓	✓	✓	✓	✓	✓	Ethane/Ethylene, Propane/Propylene special BIPs
✓	✓	✓	✓	✓	✓	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-liquid systems
✓	✓	✓	✓	✓	✓	Model predicts based on assumption of a single solid state
✓	✓					CAPE-OPEN imported K-value methods
✓	✓					CAPE-OPEN imported thermodynamics
✓	✓	✓	✓	✓	✓	Enthalpy
✓	✓	✓	✓	✓	✓	Equations of State
✓	✓	✓	✓	✓	✓	Redlich-Kwong
✓	✓	✓	✓	✓	✓	Soave-Redlich-Kwong (SRK)
✓	✓	✓	✓	✓	✓	Peng-Robinson
✓	✓	✓	✓	✓	✓	API Soave-Redlich-Kwong (API SRK)
✓	✓	✓	✓	✓	✓	Lee-Kesler
✓	✓	✓	✓	✓	✓	Benedict-Webb-Rubin-Starling (BWRS)
✓	✓	✓	✓	✓	✓	Peng-Robinson-Stryjek-Vara (PRSV)
✓	✓	✓	✓	✓	✓	Chemical Systems
✓	✓	✓	✓	✓	✓	Latent Heat
✓	✓	✓	✓	✓	✓	Special Systems
✓	✓	✓	✓	✓	✓	Amine
✓	✓	✓	✓	✓	✓	Steam Table
✓	✓	✓	✓	✓	✓	Mixed Model
✓	✓	✓	✓	✓	✓	No Enthalpy (Mass balance only)
✓	✓	✓	✓	✓	✓	User Added Data
✓	✓					User Visual C VLE compile program (ADDH)
✓	✓	✓	✓	✓	✓	Polynomial Enthalpy Model (Polynomial H)
✓	✓	✓	✓	✓	✓	Enthalpy Table

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓	✓	✓	✓	✓	User Subroutine
✓	✓	✓	✓	✓	✓	Special Option Settings
✓	✓	✓	✓	✓	✓	Heat of Mixing by Gamma
✓	✓	✓	✓	✓	✓	Heat of Solution
✓	✓	✓	✓	✓	✓	Electrolyte Enthalpy
✓	✓	✓	✓	✓	✓	Ideal gas heat capacity
✓	✓	✓	✓	✓	✓	Steam tables
✓	✓	✓	✓	✓	✓	Copmressed water pressure correction
✓	✓					CAPE-OPEN imported enthalpy
✓	✓	✓	✓	✓	✓	Transport Properties
✓	✓	✓	✓	✓	✓	Liquid Density Models
✓	✓	✓	✓	✓	✓	API Lu's Method
✓	✓	✓	✓	✓	✓	Cavett
✓	✓	✓	✓	✓	✓	Library
✓	✓	✓	✓	✓	✓	Rackett
✓	✓	✓	✓	✓	✓	Liquid Density Mixing Rules
✓	✓	✓	✓	✓	✓	Mole % Weight
✓	✓	✓	✓	✓	✓	VBA
✓	✓	✓	✓	✓	✓	Electrolyte Liquid Density Mixing Rules
✓	✓	✓	✓	✓	✓	Clark Correction to Mole % Weight
✓	✓	✓	✓	✓	✓	VBA
✓	✓	✓	✓	✓	✓	Based on Components
✓	✓	✓	✓	✓	✓	Based on Actual Volume
✓	✓	✓	✓	✓	✓	Liquid Viscosity Models
✓	✓	✓	✓	✓	✓	ASME
✓	✓	✓	✓	✓	✓	Lesou and Stiel
✓	✓	✓	✓	✓	✓	Library
✓	✓	✓	✓	✓	✓	Two Term
✓	✓	✓	✓	✓	✓	Pressure Correction
✓	✓	✓	✓	✓	✓	Liquid Viscosity Mixing Rules
✓	✓	✓	✓	✓	✓	Log Average by Mass Fraction
✓	✓	✓	✓	✓	✓	Log Average by Mole Fraction
✓	✓	✓	✓	✓	✓	VBA
✓	✓	✓	✓	✓	✓	Electrolyte Liquid Viscosity Mixing Rules
✓	✓	✓	✓	✓	✓	Log <> Mass % with Clark Correction
✓	✓	✓	✓	✓	✓	Log <> Mole % with Clark Correction

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓	✓	✓	✓	✓	Vapor Density Model
✓	✓	✓	✓	✓	✓	Chemstations Method
✓	✓	✓	✓	✓	✓	Vapor Viscosity Models
✓	✓	✓	✓	✓	✓	Chapman-Enskog
✓	✓	✓	✓	✓	✓	Library
✓	✓	✓	✓	✓	✓	Thodos
✓	✓	✓	✓	✓	✓	Dean-Stiel Pressure Correction
✓	✓	✓	✓	✓	✓	Liquid Surface Tension Models
✓	✓	✓	✓	✓	✓	Hakim
✓	✓	✓	✓	✓	✓	Hydrocarbon Correlation
✓	✓	✓	✓	✓	✓	Library
✓	✓	✓	✓	✓	✓	Miller
✓	✓	✓	✓	✓	✓	Onsager Samaras (Electrolytes)
✓	✓	✓	✓	✓	✓	Liquid Thermal Conductivity Models
✓	✓	✓	✓	✓	✓	API Procedure
✓	✓	✓	✓	✓	✓	Hydrocarbon
✓	✓	✓	✓	✓	✓	Library
✓	✓	✓	✓	✓	✓	Riedel/Jamieson (Electrolytes)
✓	✓	✓	✓	✓	✓	Vapor Thermal Conductivity Models
✓	✓	✓	✓	✓	✓	API Procedure
✓	✓	✓	✓	✓	✓	Library
✓	✓	✓	✓	✓	✓	Vapor Conductivity Correlation (>1 atm)
✓	✓	✓	✓	✓	✓	No Correction
✓	✓	✓	✓	✓	✓	API
✓	✓	✓	✓	✓	✓	Stiel-Thodos
✓	✓	✓	✓	✓	✓	Custom
✓	✓					VBA
✓	✓					CAPE-OPEN Imported Transport Properties
✓	✓	✓	✓	✓	✓	Physical Property Database
✓	✓	✓	✓	✓	✓	Components
✓	✓	✓	✓	✓	✓	Over 1500 pure components from DIPPR
✓	✓	✓	✓	✓	✓	User custimizable components
✓	✓	✓	✓	✓	✓	Group Contribution Estimation
✓	✓	✓	✓	✓	✓	UNIFAC
✓	✓	✓	✓	✓	✓	Joback
✓	✓	✓	✓	✓	✓	Methyl Esters

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓	✓	✓	✓	✓	Biodiesel
✓	✓	✓	✓	✓	✓	Edit Components
✓	✓	✓	✓	✓	✓	Property Regression
✓	✓	✓	✓	✓	✓	Antoine Vapor Pressure
✓	✓	✓	✓	✓	✓	Library Vapor Pressure
✓	✓	✓	✓	✓	✓	Heat of Vaporization
✓	✓	✓	✓	✓	✓	Liquid Density
✓	✓	✓	✓	✓	✓	Liquid Heat Capacity
✓	✓	✓	✓	✓	✓	Liquid Viscosity
✓	✓	✓	✓	✓	✓	Liquid Thermal Conductivity
✓	✓	✓	✓	✓	✓	Liquid Surface Tension
✓	✓	✓	✓	✓	✓	Polynomial Ideal Gas Heat Capacity
✓	✓	✓	✓	✓	✓	Vapor Viscosity
✓	✓	✓	✓	✓	✓	Vapor Thermal Conductivity
✓	✓	✓	✓	✓	✓	Library Idal Gas Heat Capacity (DIPPR Equation)
✓	✓	✓	✓	✓	✓	Properties
✓	✓	✓	✓	✓	✓	Synonym
✓	✓	✓	✓	✓	✓	Formula
✓	✓	✓	✓	✓	✓	Molecular Weight
✓	✓	✓	✓	✓	✓	Critical Temperature
✓	✓	✓	✓	✓	✓	Critical Pressure
✓	✓	✓	✓	✓	✓	Critical Volume
✓	✓	✓	✓	✓	✓	Acentric Factor
✓	✓	✓	✓	✓	✓	Specific Gravity at 60 °F
✓	✓	✓	✓	✓	✓	Normal Boiling Point
✓	✓	✓	✓	✓	✓	Melting Point
✓	✓	✓	✓	✓	✓	Ideal Gas Heat of Formation
✓	✓	✓	✓	✓	✓	Ideal Gas Gibbs of Formation
✓	✓	✓	✓	✓	✓	Solubility Parameter
✓	✓	✓	✓	✓	✓	Dipole Moment
✓	✓	✓	✓	✓	✓	Mean Average Boiling Point
✓	✓	✓	✓	✓	✓	Molecular Diameter
✓	✓	✓	✓	✓	✓	Heat of Vaporization
✓	✓	✓	✓	✓	✓	API Net Heating Value
✓	✓	✓	✓	✓	✓	API Gross Heating Value
✓	✓	✓	✓	✓	✓	Liquid Volume Constant

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓	✓	✓	✓	✓	Modified Acentric Factor
✓	✓	✓	✓	✓	✓	UNIQUAC Area Parameter
✓	✓	✓	✓	✓	✓	UNIQUAC Volume Paramter
✓	✓	✓	✓	✓	✓	Wilson Molar Volume
✓	✓	✓	✓	✓	✓	Stiel Polar Factor
✓	✓	✓	✓	✓	✓	Rackett Constant
✓	✓	✓	✓	✓	✓	Polar Parameter
✓	✓	✓	✓	✓	✓	Esp/K
✓	✓	✓	✓	✓	✓	Watson Factor
✓	✓	✓	✓	✓	✓	API Gravity
✓	✓	✓	✓	✓	✓	Coefficients
✓	✓	✓	✓	✓	✓	MSRK
✓	✓	✓	✓	✓	✓	Henry's Constant Coefficients
✓	✓	✓	✓	✓	✓	Equations for user components
✓	✓	✓	✓	✓	✓	Liquid Density
✓	✓	✓	✓	✓	✓	Solid Density
✓	✓	✓	✓	✓	✓	Vapor Pressure
✓	✓	✓	✓	✓	✓	Heat of Vaporization
✓	✓	✓	✓	✓	✓	Ideal Gas Heat Capacity
✓	✓	✓	✓	✓	✓	Liquid Heat Capacity
✓	✓	✓	✓	✓	✓	Solid Heat Capacity
✓	✓	✓	✓	✓	✓	Vapor Viscosity
✓	✓	✓	✓	✓	✓	Liquid Viscosity
✓	✓	✓	✓	✓	✓	Vapor Thermal Conductivity
✓	✓	✓	✓	✓	✓	Liquid Thermal Conductivity
✓	✓	✓	✓	✓	✓	Surface Tension
✓	✓	✓	✓	✓	✓	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 convertion option
✓	✓	✓	✓	✓	✓	Electrolyte User database option
✓	✓	✓	✓	✓	✓	Option to consider electrolyte precipitate formation

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓	✓	✓	✓	✓	Engineering Units
✓	✓	✓	✓	✓	✓	Engineering units converter
✓	✓	✓	✓	✓	✓	Easily convert
✓	✓	✓	✓	✓	✓	Temperature
✓	✓	✓	✓	✓	✓	Temperature difference
✓	✓	✓	✓	✓	✓	Pressure
✓	✓	✓	✓	✓	✓	Pressure difference
✓	✓	✓	✓	✓	✓	Moles/Mass
✓	✓	✓	✓	✓	✓	Energy
✓	✓	✓	✓	✓	✓	Liquid Volume
✓	✓	✓	✓	✓	✓	Liquid Volume Flow Rate
✓	✓	✓	✓	✓	✓	Liquid Density
✓	✓	✓	✓	✓	✓	Vapor Volume Flow Rate
✓	✓	✓	✓	✓	✓	Crude Flow Rate
✓	✓	✓	✓	✓	✓	Specific Heat
✓	✓	✓	✓	✓	✓	Specified Enthalpy
✓	✓	✓	✓	✓	✓	Heat Transfer Coefficient
✓	✓	✓	✓	✓	✓	Thermal Conductivity
✓	✓	✓	✓	✓	✓	Heat Flux Density
✓	✓	✓	✓	✓	✓	Entropy
✓	✓	✓	✓	✓	✓	Viscosity
✓	✓	✓	✓	✓	✓	Surface Tension
✓	✓	✓	✓	✓	✓	Length
✓	✓	✓	✓	✓	✓	Velocity
✓	✓	✓	✓	✓	✓	Area
✓	✓	✓	✓	✓	✓	Time
✓	✓	✓	✓	✓	✓	Solubility Parameter
✓	✓	✓	✓	✓	✓	Dipole Moment
✓	✓	✓	✓	✓	✓	Fouling Factor
✓	✓	✓	✓	✓	✓	Pressure Difference per length
✓	✓	✓	✓	✓	✓	Cake Resistance
✓	✓	✓	✓	✓	✓	Density * velocity2
✓	✓	✓	✓	✓	✓	Engineering units screen
✓	✓	✓	✓	✓	✓	Set flowsheet units
✓	✓	✓	✓	✓	✓	Time
✓	✓	✓	✓	✓	✓	Mass/Mole

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓	✓	✓	✓	✓	Temperature
✓	✓	✓	✓	✓	✓	Pressure
✓	✓	✓	✓	✓	✓	Enthalpy
✓	✓	✓	✓	✓	✓	Work
✓	✓	✓	✓	✓	✓	Liquid Volume
✓	✓	✓	✓	✓	✓	Liquid Volume Rate
✓	✓	✓	✓	✓	✓	Crude Flow Rate
✓	✓	✓	✓	✓	✓	Vapor Volume
✓	✓	✓	✓	✓	✓	Vapor Volume Rate
✓	✓	✓	✓	✓	✓	Liquid Density / Concentration
✓	✓	✓	✓	✓	✓	Vapor Density
✓	✓	✓	✓	✓	✓	Thickness
✓	✓	✓	✓	✓	✓	Diameter
✓	✓	✓	✓	✓	✓	Length
✓	✓	✓	✓	✓	✓	Velocity
✓	✓	✓	✓	✓	✓	Area
✓	✓	✓	✓	✓	✓	Heat Capacity
✓	✓	✓	✓	✓	✓	Specific Heat
✓	✓	✓	✓	✓	✓	Heat Transfer Coefficient
✓	✓	✓	✓	✓	✓	Thermal Conductivity
✓	✓	✓	✓	✓	✓	Viscosity
✓	✓	✓	✓	✓	✓	Surface Tension
✓	✓	✓	✓	✓	✓	Solubility Parameter
✓	✓	✓	✓	✓	✓	Dipole Moment
✓	✓	✓	✓	✓	✓	Cake Resistance
✓	✓	✓	✓	✓	✓	Packing DP
✓	✓	✓	✓	✓	✓	Currency
✓	✓	✓	✓	✓	✓	Enter Currency factor
✓	✓	✓	✓	✓	✓	Set Stream Flow Units
✓	✓	✓	✓	✓	✓	StdL ft3/h
✓	✓	✓	✓	✓	✓	StdL ft3/d
✓	✓	✓	✓	✓	✓	StdL ft3/min
✓	✓	✓	✓	✓	✓	StdL gph
✓	✓	✓	✓	✓	✓	StdL gpd
✓	✓	✓	✓	✓	✓	StdL gpm
✓	✓	✓	✓	✓	✓	StdL BPSH

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓	✓	✓	✓	✓	StdL BPSD
✓	✓	✓	✓	✓	✓	StdL BPSM
✓	✓	✓	✓	✓	✓	StdL m3/h
✓	✓	✓	✓	✓	✓	StdL m3/day
✓	✓	✓	✓	✓	✓	StdL m3/min
✓	✓	✓	✓	✓	✓	StdL L/h
✓	✓	✓	✓	✓	✓	StdL L/day
✓	✓	✓	✓	✓	✓	StdL L/min
✓	✓	✓	✓	✓	✓	StdL cc/sec
✓	✓	✓	✓	✓	✓	StdV scfh
✓	✓	✓	✓	✓	✓	StdV MMscfd
✓	✓	✓	✓	✓	✓	StdV scfm
✓	✓	✓	✓	✓	✓	StdV m3/h
✓	✓	✓	✓	✓	✓	StdV m3/day
✓	✓	✓	✓	✓	✓	StdV m3/min
✓	✓	✓	✓	✓	✓	StdV L/h
✓	✓	✓	✓	✓	✓	StdV L/day
✓	✓	✓	✓	✓	✓	StdV L/min
✓	✓	✓	✓	✓	✓	StdV cc/sec
✓	✓	✓	✓	✓	✓	Set Component Flow
✓	✓	✓	✓	✓	✓	Mole Fractions
✓	✓	✓	✓	✓	✓	Mass Fractions
✓	✓	✓	✓	✓	✓	Liquid Volume Fractions
✓	✓	✓	✓	✓	✓	Set Atmospheric Pressure Reference
✓	✓	✓	✓	✓	✓	Set Vapor reference temperature
✓	✓	✓	✓	✓	✓	Engineering units for reports
✓	✓	✓	✓	✓	✓	Mole
✓	✓	✓	✓	✓	✓	Mass
✓	✓	✓	✓	✓	✓	Std liquid volume
✓	✓	✓	✓	✓	✓	STD vapor volume
✓	✓	✓	✓	✓	✓	mole fractions
✓	✓	✓	✓	✓	✓	mass fractions
✓	✓	✓	✓	✓	✓	std. liquid volume fractions
✓	✓	✓	✓	✓	✓	std. vapor volume fractions
✓	✓	✓	✓	✓	✓	Mole %
✓	✓	✓	✓	✓	✓	Mass %

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓	✓	✓	✓	✓	Std. Liquid Volume %
✓	✓	✓	✓	✓	✓	Std. Vapor Volume %
✓	✓	✓	✓	✓	✓	Mole PPM
✓	✓	✓	✓	✓	✓	Mass PPM
✓	✓	✓	✓	✓	✓	Std. Liquid Volume PPM
✓	✓	✓	✓	✓	✓	Std. Vapor Volume PPM
✓	✓	✓	✓	✓	✓	Concentration
✓	✓	✓	✓	✓	✓	Engineering Units Displayed in UnitOps
✓	✓	✓	✓	✓	✓	**Flowsheeting**
✓	✓	✓	✓	✓	✓	Flowsheet Convergence
✓		✓	✓	✓	✓	Steady State
✓		✓	✓	✓	✓	Sequential Modular convergence
✓		✓	✓	✓	✓	Speed up methods (Wegstein, Dominant Eigenvalue)
✓		✓	✓	✓	✓	Simultaneous Modular convergence
✓		✓	✓	✓	✓	Flexible flowsheet tolerances for
✓		✓	✓	✓	✓	Flow
✓		✓	✓	✓	✓	Temperature
✓		✓	✓	✓	✓	Pressure
✓		✓	✓	✓	✓	Vapor Fraction
✓		✓	✓	✓	✓	Enthalpy
✓	✓			✓		Optimization algorithm - Maximize or minimize objective function given certain independent variables and constraints
✓	✓			✓		Define objective function as a flowsheet variable to be minimized or maximized
✓	✓			✓		Define up to 120 unconstrained, bounded, or fixed independent flowsheet variables
✓	✓			✓		Define up to 120 unconstrained, bounded, or fixed independent flowsheet contraints
✓	✓			✓		Methods
✓	✓			✓		Generalized Reduced Gradient (GRG)
✓	✓			✓		Successive Quadratic Programming (SQP)
✓	✓			✓		Simultaneous Modular SQP
✓	✓			✓		Forward or Central difference derivatives
✓	✓			✓		Flowsheet or user specific calculation sequence
✓	✓			✓		Sensitivity and Parametric analysis with reporting
✓	✓			✓		Adjust one or two flowsheet variables (Beginning / End / # of steps)
✓	✓			✓		Record up to 12 variables for reporting and analysis
✓	✓			✓		Text or Chart reports
✓	✓					Data Maps to Excel
✓	✓					Allow connection of a Microsoft Excel Spreadsheet to a CHEMCAD simulation

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓					No coding/programming required
✓	✓					Mapping of
✓	✓					Stream Parameters
✓	✓					UnitOp Parameters
✓	✓					Dynamic/OTS Time Parameters
✓	✓					Mapping From Excel to CHEMCAD
✓	✓					Mapping From CHEMCAD to Excel
✓	✓					Excel Spreadsheet can be used as a unit operation
✓	✓					Can be used for Data Reconciliation of plant data in an Excel Spreadsheet by manipulating CHEMCAD parameters to fit data
✓	✓					Flexible Execution Rules
✓	✓					Send data to or from Excel before simulation is run
✓	✓					Send data to or from Excel after simulation is run
✓	✓					Data Reconciliation method
✓	✓					Up to 10 datamaps (each with different Excel spreadsheets) can be used in a single simulation
✓	✓	✓	✓	✓	✓	Unlimited size of flowsheet (unlimited number of streams and unit operations)
✓	✓	✓	✓	✓	✓	Run entire flowsheet, group of UnitOps, or a single UnitOp
	✓			✓		Dynamics
	✓			✓		Full dynamic flowsheeting for operability, training, startup/shutdown
	✓			✓		Graphical plotting of time dependent results
	✓			✓		Online, real-time display of results during calculation
	✓			✓		Calculation interrupt
	✓			✓		Full integration into the CHEMCAD Suite and flowsheets
	✓			✓		Option to run a single time step
	✓			✓		Additional mode of operation allowing user interactivity while the simulation is running
	✓			✓		Open/close valves
	✓			✓		Change setpoints
	✓			✓		Introduce upsets
	✓			✓		Mode for connectivity to operator training systems
	✓			✓		Time history reports and plots for:
	✓			✓		All unit operation parameters including control valve position and controller output
	✓			✓		All stream parameters
	✓					Operator Training System (OTS)
	✓					CHEMCAD GUI can be disabled and/or hidden for use as an engine in an OTS environment
	✓					Time scale factor for scaling to real time
✓	✓	✓	✓	✓	✓	**Tools**
✓	✓	✓	✓			Rigorous equipment sizing routines for:

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
		✓				Heat Exchangers
		✓				General Features
		✓				Full integration into the CHEMCAD Suite and flowsheets
		✓				Output
		✓				Complete tabular and graphical reporting features including TEMA and/or API datasheets
		✓				A detailed tabulated analysis report
		✓				A detailed report of overall exchanger values
		✓				A zone-by-zone report of the heat curve, fluid properties, heat transfer and pressure drop calculations
		✓				Stream information inlet/outlet with H, T, P, and component flow rates
		✓				Optimization data
		✓				Shell and tube
		✓				Design mode - geometry calculated from user constaints 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
		✓				Design codes
		✓				TEMA R
		✓				TEMA B
		✓				TEMA C
		✓				ASME
		✓				DIN A.D. Merkblatter
		✓				British Standard 5500
		✓				Non-standard
		✓				All TEMA Front head, shell, and rear head standards
		✓				Tubeside process types:
		✓				Sensible flow (vapor or liquid)
		✓				Forced evaporation
		✓				Falling film evaporation
		✓				Vertical thermosyphon
		✓				Vertical once through thermosyphon
		✓				Horizontal condensation
		✓				Vertical condensation
		✓				Knock-back condensation
		✓				Shellside process types:
		✓				Sensible flow (vapor or liquid)
		✓				Forced evaporation

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
		✓				Horizontal thermosyphon
		✓				Horizontal once through thermosyphon
		✓				Horizontal condensation
		✓				Vertical condensation
		✓				Pool boiling
		✓				Exchangers may have evaporation on one side with condensation on the other with any combination of subcooling and superheating
		✓				Fouling factor may be user specified
		✓				Shell or tube side heat transfer calculation can be overridden
		✓				A full stream analysis is performed on the shellside
		✓				Zone-by-zone analysis is performed (2-31 zones, user defined)
		✓				2-31 zones, user defined
		✓				Conditions and properties automatically generated at all zones and can be user modified
		✓				Complete materials library for tubes, pipes, shells, bonnet, and tubesheets
		✓				Counter- or co- current exchangers
		✓				Dry- or wet- wall condensing
		✓				5 stream exchangers (evaporators with separate outlet streams for vapor and liquid) calculated
		✓				Shellside
		✓				Shells in series or parallel
		✓				Shell as pipe or plate
		✓				Sealing strips permitted
		✓				Diameter or maximum diameter may be specified
		✓				Tubeside
		✓				Tubes may be bare or fin
		✓				Fintube databank and optional user specified fintube data
		✓				Turbulators may be used on the inside of the tube
		✓				User may specify tube OD, gauge, pattern, and pitch
		✓				Tubesheet thickness calculated to determine effective area
		✓				U-bend radius and/or efficiency may be specified
		✓				Tube length or maximum tube length may be specified
		✓				Nozzles
		✓				User specified Nozzle Diameters
		✓				User specified Nozzle Orientation
		✓				Long neck nozzle option
		✓				Baffles
		✓				Baffles may be single segmental, double segmental, triple segmental, full circle, no-tubes-in-window, or rod
		✓				Specify or have the program optimize the baffle spacing, cut, and direction

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
		✓				Optional impingement baffles
		✓				Clearances
		✓				Select from available clearance standards or user defined clearances
		✓				Miscellaneous
		✓				Safety factors may be specified
		✓				Entrainment ratios
		✓				Kettle diameter
		✓				Shellside or tubeside coefficient may be fixed
		✓				Tube axial stress
		✓				Vibration analysis
		✓				Zone-by-zone analysis of heat transfer and pressure drop calculations
		✓				Methods
		✓				Tube Side
		✓				Laminar Flow
		✓				Eubank-Proctor
		✓				VDI Mean Nusselt Number
		✓				Turbulent Flow
		✓				Program Selected Best Method
		✓				Sieder-Tate
		✓				Colburn
		✓				Dittus Boelter
		✓				ESDU
		✓				Mean VDI Nusselt
		✓				Single phase Frictional Pressure Drop
		✓				Blasius
		✓				Chen
		✓				Two Phase frictional pressure drop
		✓				Lockhart Correlation
		✓				Friedel (CISE) Correlation
		✓				Chisholm Correlation
		✓				Void Fraction
		✓				Premoli et al Model
		✓				Homogeneous Model
		✓				Lockhart and Martenelli Model
		✓				Shell Side
		✓				Single phase

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
		✓				Stream Analysis
		✓				Bell Delaware
		✓				Kern
		✓				No vapor shear condensation, Horizontal
		✓				Kern
		✓				Nusselt
		✓				Eissenberg
		✓				Vapor shear condensations, Horizontal
		✓				Nusselt
		✓				McNaught
		✓				Taborek
		✓				Vertical Condensation
		✓				Chemstations
		✓				VDI Film
		✓				Falling film evaporation
		✓				Hewitt et al
		✓				VDI
		✓				Subcooling flow pattern
		✓				Liquid stratified
		✓				Liquid filled
		✓				Kettle flow
		✓				Plug
		✓				Perfect mixing
		✓				Silver Bell Ghaly for multicomponent condensation option
		✓				Parallel flow model if shell diameter is smaller than baffle spacing option
		✓				User override of LMTD correction factor
		✓				Stream Analysis
		✓				Baffle by baffle calculation on the shellside accounts for effects of clearances and shellside configurations on heat transfer and pressure drop
		✓				This analysis can be extended to include:
		✓				Finned tubes
		✓				Turbulators
		✓				Sealing strips
		✓				Impingement plates
		✓				Sparger pipes
		✓				Many other construction variables
		✓				Detailed Zone Analysis

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
		✓				At each zone, the conditions, properties, flow regime, and applicable heat transfer mechanism are calculated
		✓				Pressure drop and film coefficients calculated using the appropriate formula
		✓				Double Pipe
		✓				Design mode - geometry calculated from user constaints 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
		✓				Calculation of U-tube or straight tube double pipe exchangers (sensible to sensible heat transfer only)
		✓				Allows multitube arrangements
		✓				Shellside
		✓				Shells in series or parallel
		✓				Diameter or maximum diameter may be specified
		✓				Tubeside
		✓				Tubes may be bare or fin
		✓				Fintube databank and optional user specified fintube data
		✓				User may specify tube OD, gauge, pattern, and pitch
		✓				Tube length or maximum tube length may be specified
		✓				Nozzles
		✓				User specified Nozzle Diameters
		✓				Complete materials library for tubes
		✓				Methods
		✓				Tube Side
		✓				Laminar Flow
		✓				Eubank-Proctor
		✓				VDI Mean Nusselt Number
		✓				Turbulent Flow
		✓				Program Selected Best Method
		✓				Sieder-Tate
		✓				Colburn
		✓				Dittus Boelter
		✓				ESDU
		✓				Mean VDI Nusselt
		✓				Single phase Frictional Pressure Drop
		✓				Blasius
		✓				Chen
		✓				Shell Side

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
		✓				Laminar Flow
		✓				Program Selected Best Method
		✓				Turbulent Flow
		✓				Program Selected Best Method
		✓				Sieder-Tate
		✓				Colburn
		✓				Dittus Boelter
		✓				ESDU
		✓				Mean VDI Nusselt
		✓				Single phase Frictional Pressure Drop
		✓				Blasius
		✓				Chen
		✓				Plate and Frame
		✓				Design mode - geometry calculated from user constaints and desired performance
		✓				Rating mode - performance calculated from geometry
		✓				Fouling Rating mode - fouling calculated from geometry and performance
		✓				General
		✓				Specify Number of plates per unit
		✓				Pass arrangement
		✓				Cold side single pass / hot side multiple passes
		✓				Hot side single pass / cold side multiple passes
		✓				Both sides equal passes (user specify number of passes)
		✓				Complete materials library for plates
		✓				Sensible to sensible heat transfer
		✓				Film coefficients may be calculated or specified
		✓				Plate
		✓				Corrugation
		✓				Chevron
		✓				Intermating
		✓				User specified
		✓				Specify height, weight, thickness, spacing, thermal conductivity, chevron angle, and effective area
		✓				Nozzles
		✓				User specified Nozzle Diameters
		✓				User specified number of nozzles
		✓				Methods
		✓				Heat Transfer

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
		✓				HEDH, Kumar 1989 (Heat Exchanger Design Handbook)
		✓				User Specified Parameters
		✓				Frictional Pressure Drop
		✓				HEDH, Kumar 1989
		✓				User Specified Parameters
		✓				Air Cooled
		✓				Design mode - geometry calculated from user constaints and desired performance
		✓				Rating mode - performance calculated from geometry
		✓				Fouling Rating mode - fouling calculated from geometry and performance
		✓				Tubeside process types:
		✓				Sensible flow (vapor or liquid)
		✓				Horizontal condensation
		✓				Vertical Condensation
		✓				Reflux Condensation
		✓				Fouling factor may be user specified
		✓				Shell or tube side heat transfer calculation can be overridden
		✓				Design codes
		✓				ASME
		✓				DIN A.D. Merkblatter
		✓				British Standard 5500
		✓				Tubeside
		✓				Tubes may be bare or fin
		✓				Fintube databank and optional user specified fintube data
		✓				Turbulators may be used on the inside of the tube
		✓				User may specify tube OD, gauge, pattern, and pitch
		✓				Tubesheet thickness calculated to determine effective area
		✓				U-bend radius and/or efficiency may be specified
		✓				Tube length or maximum tube length may be specified
		✓				Tubes may be Welded or seamless
		✓				Fin attachments may be extruded, welded, grooved, or galvanized
		✓				Bundle
		✓				Number of tubes per row
		✓				Total number of rows
		✓				Number of rows per pass
		✓				Number of passes per bundle
		✓				Number of rows per bay

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
		✓				Slope of header
		✓				Bay connections can be in parallel and/or series
		✓				Bundle connections can be in parallel and/or series
		✓				Nozzles
		✓				User specified Nozzle Diameters
		✓				Miscellaneous
		✓				Headers can be Plug, Coverplate, Bonnet, Split, U-tube, or Pipe(dished)
		✓				Header gaskets can be Spiral Wound, corrugated asbestos filled, corrugated, flat asbestos filled, grooved, solid, or metallic o-ring
		✓				Flanges can be slip on, weld neck, lap joint, ring type joint, or long weld neck
		✓				User specified
		✓				Header Design Temperature
		✓				Header Design pressure
		✓				Flange rating (ANSI, API, DIN)
		✓				Complete materials library for tubes, plug, header gasket, fan blade, fan hub, and fins
		✓				Dry wall and wet wall condensing can be accommodated
		✓				Fan data from the following manufacturers are provided:
		✓				Checo
		✓				Moore
		✓				Environment Element Corporation
		✓				Aerovent
		✓				Hudson
		✓				Fan drive data from the following manufacturers are provided:
		✓				GE
		✓				Westinghouse
		✓				Reliance
		✓				Methods
		✓				Tube Side
		✓				Heat Transfer
		✓				Single Phase Laminar Flow
		✓				Eubank-Proctor
		✓				Single Phase Turbulent Flow
		✓				Program Selected Best Method (Sieder-Tate, Dittus-Boelter, or ESDU)
		✓				Vertical Condensation
		✓				VDI Film
		✓				Chemstations
		✓				Horizontal Condensation

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
		✓				Palen et al
		✓				Single Phase Frictional Pressure Drop
		✓				Blasius
		✓				Two Phase Frictional Pressure Drop
		✓				Lockhart-Martinelli
		✓				Void Fraction Model
		✓				Premoli et al
		✓				Air Side
		✓				Heat Transfer
		✓				Plain Tube Array
		✓				ESDU 1986 (Enginerring Scince Data Unit)
		✓				Low-Fin
		✓				ESDU 1984
		✓				High-Fin, In-Line Array
		✓				Schmidt
		✓				High-Fin, Staggered Array
		✓				ESDU 1986
		✓				Frictional Pressure Drop
		✓				Plain Tube Array
		✓				Zukauskas and Ulinskas
		✓				Loq-Fin
		✓				ESDU 1984
		✓				High-Fin
		✓				ESDU 1986
✓	✓		✓			Trays (Sieve, Bubble cap, Valve)
✓	✓		✓			Packing (Random & Structured)
✓	✓			✓		Pipes
✓	✓			✓		Pressure Vessels
✓	✓			✓		Orifices
✓	✓			✓		Control Valves
✓	✓			✓		Three Phase Vessels
✓	✓			✓		Safety Relief Devices (DIERS)
✓	✓			✓		Design of new devices or rating of existing devices
✓	✓			✓		Practical, comprehensive, field tested DIERS (Design Institute for Emergency Relief Systems) analysis facility
✓	✓			✓		This can be used to simulate reactive emergency relief situations on a dynamic basis
✓	✓			✓		The DIERS results are included in the heat and material balance of a CHEMCAD CSTR or dynamic vessel (DVSL) if desired

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓			✓		Relief device, rupture disk or both
✓	✓			✓		Can use API table of sizes or actual calculated sizes
✓	✓			✓		Specify vessel geometry or use CHEMCAD CSTR/DVSL
✓	✓			✓		Design Methods
✓	✓			✓		Rigorous
✓	✓			✓		Short Cut
✓	✓			✓		Vessel Models
✓	✓			✓		Bubbly
✓	✓			✓		Churn-turbulent
✓	✓			✓		Homogenous Vessel
✓	✓			✓		Vent Flow Models
✓	✓			✓		Homogenous Equilibrium (HEM)
✓	✓			✓		Equilibrium Rate (ERM)
✓	✓			✓		Henry-Fauske (HNE)
✓	✓			✓		Non-flashing liquid
✓	✓			✓		Single phase vapor
✓	✓			✓		Steam relief
✓	✓			✓		Homogenous Frozen (HFZ)
✓	✓			✓		Vent Flash Model
✓	✓			✓		Constant Enthalpy
✓	✓			✓		Constant Entropy
✓	✓			✓		Heat Model
✓	✓			✓		API 520/521
✓	✓			✓		API 2000
✓	✓			✓		OSHA 1910.106
✓	✓			✓		NFPA-30
✓	✓			✓		Specify heat rate
✓	✓			✓		Specify vent flow rate
✓	✓			✓		Tempered runaway reaction
✓	✓			✓		Non-tempered runaway reaction
✓	✓			✓		Specify inlet/outlet piping
✓	✓			✓		User override of fluid properties
✓	✓			✓		Comprehensive Reporting
✓	✓	✓	✓	✓		Specification sheets in Microsoft Excel with pre-built templates for:
✓	✓					Baghouse filter
✓	✓			✓		Compressor

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓					Fired Heater
✓	✓	✓		✓		Heat Exchanger (including TEMA sheet w/CC-THERM)
✓	✓			✓		Pump
✓	✓		✓			Distillation column
✓	✓			✓		Tank
✓	✓			✓		Valve
✓	✓			✓		Costing/Economics
✓	✓			✓		Unit Operation / Equipment Costing
✓	✓			✓		Plant/Process Economics
✓	✓	✓	✓	✓	✓	Data Regression
✓	✓	✓	✓	✓	✓	Pure component physical property regression
✓	✓	✓	✓	✓	✓	Multicomponent VLE/LLE regression from user data, UNIFAC, or infinite dilution data
✓	✓	✓	✓	✓	✓	Regression of electrolyte data
✓	✓					Reaction rate regression from Temperature, Heat, and Concentration data
✓	✓					Data Reconciliation
✓	✓					Flexible data file format
✓	✓					GRG, SQP, and Simultaneous Modular SQP methods
✓	✓					Interface to Excel through CHEMCAD's Excel DataMap functions
✓	✓					Simultaneous:
✓	✓					Steady state (gross error) detection
✓	✓					Data reconciliation
✓	✓					Parameter estimation
✓	✓					User defined model parameters can be estimated
✓	✓					User defined model constraints
✓	✓			✓	✓	Vapor Venting/Depressurizing
✓	✓	✓	✓	✓	✓	EPA WAR Algorithm for environmental and health impact studies
✓	✓			✓	✓	Hydrate/Solid CO_2 prediction
✓	✓			✓	✓	Total Organic Content/Chemical Oxygen Demand calculation
✓	✓	✓	✓	✓	✓	**Reporting**
✓	✓	✓	✓	✓	✓	Text Reports
✓	✓	✓	✓	✓	✓	Available in
✓	✓	✓	✓	✓	✓	Internal text report viewer
✓	✓	✓	✓	✓	✓	Microsoft Wordpad
✓	✓	✓	✓	✓	✓	Microsoft Word
✓	✓	✓	✓	✓	✓	Microsoft Excel
✓	✓	✓	✓	✓	✓	Stream Compositions / Properties (Single / Multiple Streams or Groups)

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓	✓	✓	✓	✓	Particle Size Distribution
✓	✓	✓	✓	✓	✓	Pseudo-component Curves
✓	✓	✓	✓	✓	✓	UnitOps (Single / Multiple Unit Operations or Groups)
✓	✓	✓	✓	✓	✓	Specification Sheets
✓	✓		✓			Distillation
✓	✓		✓			Collumn 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
✓	✓	✓	✓	✓	✓	Unit Op Charts
✓	✓		✓			Tower Profiles
✓	✓	✓		✓		Heat Curves
✓	✓					Plug Flow Reactor Profiles
✓	✓			✓		Pipe Profile
✓	✓			✓		Controller Convergence
	✓		✓	✓		Dynamic Charts

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
	✓					Batch Reactor / Dynamic Vessel History
			✓			Batch Column History
	✓					Dynamic Column History
	✓			✓		Dynamic Stream History
	✓			✓		Dynamic UnitOp History
✓						Stream Recorder History
✓	✓	✓	✓	✓	✓	User Specified File chart
✓	✓	✓	✓	✓	✓	Symbol Builder for custom graphic representations
✓	✓	✓	✓	✓	✓	**GUI**
✓	✓	✓	✓	✓	✓	Explorer Tree
✓	✓	✓	✓	✓	✓	Tree Display of simulation data including:
✓	✓	✓	✓	✓	✓	Components used in the simulation
✓	✓	✓	✓	✓	✓	Thermodynamic settings
✓	✓	✓	✓	✓	✓	Unit Operations
✓	✓	✓	✓	✓	✓	Streams
✓	✓	✓	✓	✓	✓	Sensitivity Analyses
✓	✓					Data Maps
✓	✓	✓	✓	✓	✓	Saved Charts
✓	✓	✓	✓	✓	✓	UnitOp and Stream Groups
✓	✓	✓	✓	✓	✓	Flowsheet Layers
✓	✓	✓	✓	✓	✓	UnitOp and Stream Templates
✓	✓	✓	✓	✓	✓	Color and icon indications of warnings / errors / convergence
✓	✓					Tree display of CHEMCAD VBA modules
✓	✓	✓	✓	✓	✓	Recently used file list
✓	✓	✓	✓	✓	✓	Unit Operations Palette
✓	✓	✓	✓	✓	✓	Standard UnitOps with multiple icons
✓	✓	✓	✓	✓	✓	UnitOp groups for UnitOps families
✓	✓	✓	✓	✓	✓	Customizable icons for standard UnitOps
✓	✓	✓	✓	✓	✓	Customizable icons for user-added UnitOps
✓	✓	✓	✓	✓	✓	Custom groups for commonly used UnitOps
✓	✓	✓	✓	✓	✓	Search bar and search results Group for finding UnitOps
✓	✓	✓	✓	✓	✓	Messaging Window
✓	✓	✓	✓	✓	✓	Warning and Error Display
✓	✓	✓	✓	✓	✓	Calculation Progress and Run Trace information
✓	✓	✓	✓	✓	✓	User Notes area for annotating flowsheet
✓	✓	✓	✓	✓	✓	Flowsheeting Window

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓	✓	✓	✓	✓	Scalable flowsheet area for small or large flowsheets
✓	✓	✓	✓	✓	✓	Layers for customizing graphics and annotations
✓	✓	✓	✓	✓	✓	Hide/show UnitOp and stream IDs
✓	✓	✓	✓	✓	✓	Color-coded UnitOp IDs for warnings/errors
✓	✓	✓	✓	✓	✓	PFD
✓	✓	✓	✓	✓	✓	Stream Databoxes
✓	✓	✓	✓	✓	✓	Unit Operation Databoxes
✓	✓	✓	✓	✓	✓	T & P Boxes
✓	✓	✓	✓	✓	✓	Text Boxes
✓	✓	✓	✓	✓	✓	Excel Spreadsheet Range Display on Flowsheet
✓	✓	✓	✓	✓	✓	Import of Graphics/Logos
✓	✓	✓	✓	✓	✓	Export to Clipboard as Metafile
✓	✓	✓	✓	✓	✓	Export PFD to .DXF (AutoCAD)
✓	✓	✓	✓	✓	✓	UnitOp copy / paste with all specifications
✓	✓	✓	✓	✓	✓	Copy Streams from other simulations (one time or permanent link)
✓	✓	✓	✓	✓	✓	Create UnitOp or Stream groups for quick access to subsets of the flowsheet
✓	✓	✓	✓	✓	✓	Create UnitOp or Stream templates for commonly used specifications across multiple simulations
✓	✓	✓	✓	✓	✓	Help System
✓	✓	✓	✓	✓	✓	Full technical reference material for all calculations and unit operations
✓	✓	✓	✓	✓	✓	Tutorials and User Guide for navigating the interface (printed User Guide available)
✓	✓	✓	✓	✓	✓	CHEMCAD Coach system for step by step instructions for common simulation work
✓	✓	✓	✓	✓	✓	Email simulations directly from CHEMCAD (using your email client)
✓	✓	✓	✓	✓	✓	Zoom to find UnitOp or Streams on large flowsheets using ID numbers
✓	✓	✓	✓	✓	✓	Autosave system saves data at regular (user specified) intervals and includes automatic file recovery at startup
✓	✓					**Extensibility**
✓	✓					VBA/VSTA
✓	✓					Licensed, embedded Visual Basic for Applications (VBA) and Visual Studio Toolkit for Applications (VSTA) included in CHEMCAD
✓	✓					Create custom code for
✓	✓					Unit operations
✓	✓					Mixing rules
✓	✓					Thermodynamic properties
✓	✓					Reaction kinetics
✓	✓					Any user-defined calculation desired
✓	✓					Most CHEMCAD functionality exposed in a documented library of function calls
✓	✓					OLE/COM/DCOM
✓	✓					3rd party applications can connect to CHEMCAD to read/write variables and run simulations

CC-STEADY STATE	CC-DYNAMICS	CC-THERM	CC-BATCH	CC-SAFETY NET	CC-FLASH	
✓	✓					CHEMCAD can act as client or server in a generic COM environment
✓	✓					Allows CHEMCAD to be an engine inside of a 3rd party application
✓	✓					Most CHEMCAD functionality exposed in a documented library of function calls
✓	✓					CAPE OPEN
✓	✓					Import 3rd party thermodynamics/physical property packages into a CHEMCAD simulation
✓	✓					Uses CAPE-OPEN standard v1.0
✓	✓					OPC
✓	✓					A CHEMCAD Simulation can be an OPC Data Server
✓	✓					All stream and UnitOp data published for both steady state and dynamic simulations
✓	✓					All time data published for dynamic simulations
✓	✓					Steady state run function available to OPC Clients
✓	✓					Dynamic run function available to OPC Clients
✓	✓					Run single time step (dynamics) function available to OPC Clients
✓	✓					OPC Foundation Compliance and Interoperability tested for Data Access (DA) v2.05
✓	✓					XML
✓	✓					Export all simulation data to a tree-d format XML file (pending)
✓	✓					Export to Bentley AXSYS via XML
✓	✓	✓	✓	✓	✓	**Licensing**
✓	✓	✓	✓	✓	✓	Methods
✓	✓	✓	✓	✓	✓	Safenet SuperPro local dongle (hardware key)
✓	✓	✓	✓	✓	✓	Safenet SuperPro network dongle (hardware key)
✓	✓	✓	✓	✓	✓	Safenet License Manager network key (software key)
✓	✓	✓	✓	✓	✓	System Authorization local key (software key)
✓	✓	✓	✓	✓	✓	License Duration
✓	✓	✓	✓	✓	✓	Hours per year
✓	✓	✓	✓	✓	✓	Monthly
✓	✓	✓	✓	✓	✓	1, 3, 5, and 10 year licenses
✓	✓	✓	✓	✓	✓	Program Modules
✓						CC-STEADY STATE (standalone) for steady state calculations
	✓					CC-DYNAMICS (add-on or standalone) for dynamic calculations
		✓				CC-THERM (add-on or standalone) for rigorous heat exchanger calculation
			✓			CC-BATCH (add-on or standalone) for batch distillation
				✓		CC-SAFETY NET (add-on or standalone) for pipe network and safety relief calculations
					✓	CC-FLASH (standalone) for physical property and phase equilibrium calculations