

BR&E ProMax[®] 2.0 (Build 2.0.12198.0) Release Notes

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Bryan Research & Engineering, Inc.

Welcome to the release of ProMax 2.0 (build 2.0.12198.0). This upgrade contains many new features and enhancements relative to ProMax 1.x that we feel will assist you in your simulation work. If you need assistance or would like to report a problem in ProMax, please contact our technical support group at support@bre.com. Further, we would encourage you to seek our assistance in questions related to program applicability. ProMax is a robust, accurate simulator that can be used in many processes.

Build 2.0.12198.0 of ProMax is a maintenance upgrade of earlier ProMax 2.0 releases. A list of the significant changes relative to earlier releases is presented near the end of these release notes. The upgrade is available in both a Windows Installer Service binary patch file (msp) and a CDROM distribution. The binary patch file is primarily intended for Internet downloads and application.

ProMax utilizes Microsoft Visio[®] 2002, Microsoft Visio 2003, or Microsoft Visio 2007 as its drawing package. All flowsheets are drawn using Visio. You must have a legal copy of either Microsoft Visio 2002, 2003, or 2007 Professional or Standard to use ProMax through its GUI. **This particular version of ProMax is not compatible with other releases of Visio, including any future releases.** The version of Visio installed on your computer can be found by using the Help->About menu item in Visio. Microsoft offers a 30 day trial version of Visio on its website at <http://office.microsoft.com/visio>. Additionally, depending on the version, Visio requires a patch from Microsoft to use successfully with ProMax. See Obtaining the Required Visio Patch section for more details.

ProMax 2.0 will run on Windows 2000 (Professional or Server), Windows XP (Media Center, Professional or Home), Windows Server 2003, or Windows Vista operating systems. ProMax will run on 64-bit Windows XP, provided Microsoft hotfix 924639 is installed, and 64-bit Windows Vista. **Unlike ProMax 1.x, ProMax 2.0 will not install or run on Windows NT4 based systems. Further, ProMax is not compatible with Windows 95, Windows 98, or Windows Me which are not designed upon the NT kernel.** There are no plans on supporting any of the Windows 9x compatible operating systems with ProMax.

When ProMax is loaded by Visio, Visio will issue a warning concerning the presence of macros. This warning is provided by Microsoft Office applications to warn you of the possible presence of viruses that may be present within the macros. Microsoft has created a strategy where the macros are digitally signed by their author so you are assured of their integrity. Digital signatures require a trusted third party to verify the authenticity of the signature and its data. Not all macros are signed. The author of unsigned macros is unknown and usually should be considered suspect. All BR&E documents pertaining to Visio or other Microsoft Office applications are digitally signed. This digital signature can be verified by inspecting the certificate displayed in the warning message. You must allow all BR&E signed macros to execute or you will prevent ProMax from functioning properly. You should add BR&E to your trusted list of macros to ensure proper execution of ProMax.

Obtaining the Required Visio Patch or Service Pack in Visio 2002 & 2003

During ProMax development in mid 2003, BR&E discovered a problem in Microsoft Visio that can cause corruption in files saved in ProMax or Visio due to loss of digital certificate signatures. While this problem was discovered during the initial beta test period for Visio 2003, we were unable to determine the exact cause of the problem with Microsoft at that time and consequently a solution was not obtainable. Early in 2004, we discovered the fundamental cause of the problem and were able to work with Microsoft to develop a Visio patch to solve this issue.

The digital certificate problem is present in both Visio 2002 and Visio 2003. Unfortunately, it may be more severe in Visio 2002 because the problem is present without warning to the user. With the release of Microsoft Office 2003 products, Microsoft set the default macro security level in documents to high. This causes any document with a missing digital certificate to fail on load. However, in Visio 2002, the default macro security level is medium which does not cause failure on load. Files saved with Visio 2002 will likely fail if the user upgrades to Visio 2003 if the digital signature has been silently lost unless the security level is changed.

You can determine if the minimum patch level is met by inspecting the full build available from the Help->About menu item in Visio. For Visio 2003, the build number must be 11.4301.6360 or greater. For Visio 2002, the build number must be 10.0.6002 or greater.

For Visio 2003 users, the patch has been rolled into Service Pack 2 for Visio 2003 which may be downloaded from the Microsoft Office website at <http://office.microsoft.com/en-us/officeupdate/default.aspx>. However, for Visio 2002 users, the method to obtain the fix is through a Visio patch or hotfix. As of this writing the patch has not been rolled into a Visio 2002 Service Pack. Due to copyright restrictions, the patch must be obtained directly from Microsoft. You can obtain the patch for Visio 2002 (10.0.6002) by following the instructions in the Microsoft Knowledge Base article 890668 available at <http://support.microsoft.com/?id=890668>. Note that you must apply Visio 2002 Service Pack 2 before installing this patch. Due to the severity of this problem and the potential for data loss, ProMax will issue a warning each time you start the application if this patch is not installed. There should be no cost involved with obtaining the patch. Please contact our customer support if you have questions or problems with the above requirement.

Warnings and Warranty

The user assumes full responsibility for the results and application obtained from the use of ProMax. No implied warranty of merchantability, no implied warranty of fitness for any purpose, and no implied warranty arising by usage of trade, course of dealing, or course of performance is given by BR&E or shall arise from ProMax.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

ProMax is protected by copyright law and international treaties. Unauthorized reproduction, distribution, or reverse engineering of this program, or any portion of it, may result in severe civil and criminal penalties and will be prosecuted to the maximum extent possible under law.

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Installation of ProMax 2.0

ProMax uses Windows Installer Service 3.1 (WIS) technology for installation. The installer supports standard as well as administrative installs through a file or application server. In this release, a security device is not required to perform the installation. However, you must have a valid BR&E security device present to run ProMax. To install ProMax on a workstation, you must either be an administrator, or you must have elevated installation privileges set through either an IntelliMirror® approach or a group policy setting. Although not absolutely required, BR&E recommends that Microsoft Visio be installed and functioning prior to installing ProMax.

During the installation process, ProMax 2.0 will uninstall prior beta versions that may be installed, as well as any version of ProMax 1.x. Simultaneous installation of multiple versions of ProMax is not allowed. User customizations made to the Options.xml file will be migrated into the ProMax 2.0 files. Note that project files created with the beta versions will not be readable using this final release and must either be converted by you or sent to support@bre.com for conversion. BR&E strongly recommends that you discard all beta media to minimize technical support issues and accidental installations of beta versions. BR&E will no longer support any of the beta releases now that the official release is available, except for conversion issues from the beta to the official release. All files from official ProMax 1.x releases can be read using ProMax 2.0.

You should insure your system meets the minimum software requirements before installing. **ProMax will not run properly on systems that do not meet the minimum software requirements.** For Windows 2000, Service Pack 4 is required. For Windows XP, Service Pack 2 is recommended but not required. BR&E recommends that you keep your system up to date with current service packs and major patches to ensure compatibility now and in the future.

When performing the install, you should select to install the SafeNet Sentinel LDK Run-Time Environment (RTE). In previous versions, the security device driver was required only if a key was physically attached to the system running ProMax. Currently, the RTE is required to provide communication with the license manager in network environments as well. SafeNet recommends that the RTE installation be performed *without* the security device attached to the system.

If you are using a network based security device, the Sentinel LDK RTE must be installed on the system that will host the key and serve as the network License Manager (LM). You may select any system in your network for this service that is accessible by the workstations that will run ProMax with a static IP address or hostname resolvable by DNS. The RTE software is available with the DVD distribution in a folder named "Sentinel Key". Both GUI and command line

versions of the installer are present. There is also a BR&E vendor specific version of the command line installer that is required if the license manager will host software keys for detachable licenses. This version will install BR&E vendor specific libraries that are required for use with software keys. Please see the document “ProMax Security Key Information” on the ProMax DVD or the ProMax help for more information on this topic.

Unless the Sentinel License Manager is available through IP broadcast, the RTE will require configuration to specify the address or DNS name of the system with the network key. This configuration must be made on each system that will run ProMax. This configuration is made through a web based console that configures the RTE. The web application is called the Sentinel Admin Control Center (ACC). The configuration is performed using http protocol on port 1947. To access the configuration section, open your web browser and navigate to the location <http://localhost:1947>. Click Configuration under Options followed by the Access to Remote License Managers tab. On that page, use the Specify Search Parameters to enter either the IP address or the hostname of the system with the network key. Multiple locations may be specified by placing entries on separate lines. This will be required if separate systems are used to host Sentinel protected applications from different vendors, or if you host ProMax keys on more than one license manager. Separate host systems are not required with different applications as any number of keys can be attached to a single host. However, you may distribute Sentinel keys to separate hosts as you desire. By default, only local administration of the Sentinel LDK RTE is permitted. This can be changed on the Basic Settings tab. For more information concerning the Sentinel Admin Control Center, select the help links on the appropriate page.

As indicated earlier, this release of ProMax is available in two formats, a binary patch file and a CDROM distribution. Both the binary patch file and the CDROM distribution allow for upgrading earlier ProMax 2.0 versions, with the binary patch file primarily intended for use with Internet downloads. All new installations must be made using the CDROM distribution.

Performing an Initial Installation from CDROM

This procedure is intended for use on systems that do not contain an earlier version of ProMax 2.0, but may contain a version of ProMax 1.x. If an earlier version of ProMax is installed, you should normally leave it installed so that the settings can be migrated into the current release during installation.

To install the program on these systems, insert the CDROM into your system. The system should auto-run the CDROM and allow you to start the installation program. If needed, you may start the installation program by running the SETUP.EXE program on the CDROM. You should invoke the SETUP.EXE program rather than the MSI file as this program ensures all prerequisite components are installed. The installation program will determine the type of installation that needs to be made (fresh install or upgrade) and perform the appropriate action.

To perform an administrative install, you must run SETUP.EXE with the /a command line option. Note that an administrative install is used for placing ProMax on a file server for distribution using IntelliMirror or other alternative approaches. The administrative install does

not actually install the application on the server. Do not confuse an administrative install with the administrator account or elevated privilege requirement for installing on a single workstation.

Upgrading ProMax Using the Binary Patch

The simplest method to upgrade ProMax is through the InstallShield Update Service capability in ProMax using a log-in account with the required privileges. Using this approach, all of the details of downloading and applying the patch are automatically handled. Simply log into an account with elevated installation privileges and use the InstallShield Update Manager on the ProMax start menu in Windows, or the Help->ProMax menu item in ProMax itself to obtain and apply the patch.

If desired or if you do not use the InstallShield Update Service, you may download and apply the patch manually. The upgrade is distributed as a single compressed WinZip executable file containing the standard binary patch file (MSP) for the Windows Installer Service. If you extract the MSP patch file from the download executable file, do not attempt to apply the patch by simply double clicking the MSP file in Windows Explorer. You must manually run the Windows Installer program (msiexec) supplying the appropriate command line switches for proper patching to occur. In general, we recommend you apply the patch using the downloaded executable file directly without extracting the MSP file as the proper command line switches are automatically inserted for you. Improper command line switch usage will result in incorrect patching.

For standalone installations, simply follow these instructions to install the patch:

- 1) Download the patch using the InstallShield Update Service or contact BR&E for instructions on how to obtain the patch.
- 2) Log in using an account with elevated privileges.
- 3) Execute the patch file to apply the patch on the system.

To patch an administrative installation used to distribute the application in a network environment, the steps are:

- 1) Download the patch using the InstallShield Update Service or contact BR&E for instructions on how to obtain the patch.
- 2) Extract the MSP patch file to a temporary folder from the self extracting ZIP file.
- 3) Log in using an account with sufficient privileges to modify the administrative share and to force redeployment of the application.
- 4) Patch the administrative share using the command:
`msiexec /a [Path to Administrative Image]\ProMax.msi /p [Path to MSP Binary Patch]`
- 5) Force a redeployment of the ProMax application using Active Directory or other approach used to redeploy the application.

Upgrading ProMax Using the CDROM Distribution

The upgrade of ProMax may be accomplished using a ProMax CDROM as well as a binary patch. Since the patch process is typically much faster to perform, the CDROM will only be distributed to customers upon request. To upgrade a standalone installation, simply run the Setup.exe program on the CDROM using an account with local administrator privileges. If you wish to use the MSI file directly, you must issue the case-sensitive command:

```
msiexec /i [path to CDROM]\ProMax.msi REINSTALL=ALL REINSTALLMODE=vomus
```

You cannot simply double click the MSI file in Windows Explorer because the command line options above will not be present. The Setup.exe program internally determines the current installation state and starts the msiexec process using the proper command line arguments.

New Features in ProMax 2.0.12198 Relative to ProMax 2.0.7047

1. The security model from the upcoming major release of ProMax, ProMax 4.0, has been incorporated into this build. The new security model offers many enhancements, including detachable licenses for network licensees. The design also offers improved reliability and availability in networks, especially in environments with high simultaneous demand such as classrooms. This update is required to provide compatibility with the security device as used in ProMax 4.0. Without this upgrade, you will not be able to use the same security device with ProMax 4.0 and earlier releases of ProMax. To provide compatibility with all earlier releases, updates are being made available to versions of ProMax back to version 1.2. A PDF document entitled "ProMax Security Key Information" is being made available as part of the DVD distribution to assist you in installing and activating the security device. Initial use of keys requires activation with the new Licensing Wizard which is distributed with this update. Please see the document for more information.
2. The FlexNet Connect system by Flexera Software is being replaced by a BR&E internally developed utility called the BR&E Notification Manager in order to serve the requirements of ProMax better.

New Features in ProMax 2.0.7047 Relative to ProMax 1.2

1. ProMax contains a complete reactor suite for modeling kinetic (plug flow and stirred tank), equilibrium, conversion, and Gibbs minimization schemes. Kinetic, equilibrium, and conversion reactions are specified through Reaction and Reaction Set objects.
 - a. The Reaction object includes items specific to an individual reaction including stoichiometry, forward and reverse orders, kinetic parameters, equilibrium constant data, and conversion data for conversion reactors. For reversible reactions, ProMax allows the calculation of the reverse (or forward) rate from the forward (or reverse) rate and the equilibrium constant. Reaction rate expressions can be based on mole fraction, molarity, activity, fugacity, partial pressure, mass fraction and mass concentration. As in other areas of the program, ProMax is very flexible in unit selection for specification of reaction parameters.

- b. The Reaction Set object is the required vehicle by which reactions are made available to a Reactor block. Simultaneous or consecutive reactions are created by grouping individual Reaction objects into a Reaction Set object. Catalytic reactions can be modeled, and the effect of adsorption on the rate constant is specifiable by the user.
 - c. Reaction objects are defined on a global basis so that their information is available in any reactor in a project. ProMax allows for modification of the global information at the individual reactor level when required.
 - d. For Gibbs minimization calculations, neither the Reaction nor the Reaction Set objects are required. Instead, the user selects the appropriate set of components to be included in the minimization process. Optionally, constraints can be applied to the Gibbs minimization calculations.
 - e. The reactor is tightly integrated with the heat exchanger rating package for heat transfer calculations.
2. With the new reactor modeling capabilities of ProMax, the program can now be used to model the Claus sulfur process as was available in TSWEET. In addition, there are significant enhancements in ProMax relative to TSWEET for this process.
- a. ProMax includes all sulfur species, S_1 through S_8 where TSWEET only provides S_2 , S_6 , and S_8 . We recommend you include all sulfur species from S_2 through S_8 , inclusive, in your simulations to predict the distribution. Since atomic sulfur (S_1) is produced in insignificant quantities except at very high temperature, it can normally be excluded from the list. We have carefully scrutinized the data available for these sulfur species and have selected what we feel are the best data available today.
 - b. ProMax will predict the solubility of H_2S in liquid sulfur.
 - c. ProMax accurately models the viscosity of liquid sulfur, including the effect of dissolved H_2S on viscosity.
 - d. More flexible constraints with Gibbs free energy minimization single phase reactors are provided. A constraint counter keeps track of the possible number of additional constraints available. Linear constraints are available for all components, not just COS and CS_2 . Non equilibrium constraints for components such as COS, CS_2 , H_2 , and CO in the furnace and waste heat boiler can now be modeled with different common empirical correlations. Quench Temperature constraints are also available. More guidance in the applicability of the constraints based on process feed conditions is available in the Help
 - e. Combining a solver or specifier with the linear constraints allows the user to use their own empirical constraints if needed.

To assist you in utilizing this new capability, this version of ProMax includes several examples of its application to Claus sulfur processes.

- 3. Rating of gasketed, plate-frame heat exchangers is now available in ProMax. This was present in PROSIM and TSWEET but postponed in ProMax until this release.
- 4. Several enhancements related to the Pipeline block and Line Sizing Analysis have been made including:

- a. The Aziz-Govier-Fogarasi correlation has been added for upward vertical multiphase flow. For horizontal multiphase flow, additional correlations include Mandhane-Gregory-Aziz, Lockhart-Martinelli, and the Friedel and Chisholm modifications of Lockhart-Martinelli. For the Beggs and Brill correlation, options have been added to enable/disable the Palmer and Payne modifications for pipe roughness and liquid holdup for inclined flow.
 - b. Pipelines can now calculate the heat transfer coefficient by conduction or convection for pipelines or wells that are buried, submerged, or above ground. Common materials can be selected for the pipe wall, insulations, and the ground type surrounding the pipe, or the thermal conductivities can be entered directly. If needed, user-defined insulations and ground types can also be added to the list of available materials.
 - c. Common types of Fittings and Valves and their average Resistance Coefficient values can now be selected in the Pipeline block. User-defined fittings can also be added to the list of available fittings.
 - d. The OLGAS steady-state multiphase flow model is now available in ProMax by licensing through Scandpower Petroleum Technology. The OLGAS 2-phase and 3-phase models are available in both the Line Sizing Analysis and the Pipeline block. Please see the Scandpower website at <http://www.olgaworld.com> for licensing and other information.
5. The wall thickness of pipes in line sizing and the pipeline block can now be specified in addition to the schedule.
6. Changes in material properties in the 2004 ASME B31.3 Process Piping Code have been made. In addition to property changes, several new pipes have been added for use in the line sizing analysis and pipe line block.
7. The program now allows the user to define UserValue objects which are values that are defined by the user. Related UserValue objects are grouped into UserValueSets, defined by the user.
 - a. The user value is either set directly by the user as a constant, or by a specifier using an algebraic expression defined in the specifier. The user value can be a function of any number of independent variables as selected in the specifier.
 - b. Any of the predefined unit combinations present in ProMax (e.g., mass flow rate) may be selected for a user value. Alternatively, a custom unit may be defined which combines standard units in ProMax or utilizes unknown units such as currency.
 - c. The results from a user value can be displayed on the flowsheet in Visio or utilized in dependent calculations in specifiers and solvers. See the online help for more information on this powerful new feature in ProMax.
8. ProMax now includes energy budget and recovery calculation objects that are fully customizable by the user.
 - a. When a new project is created, or a ProMax 1.x project is opened, four predefined recovery objects and two predefined energy budget objects (one each for

- duty/heat and power) are created automatically by ProMax. Additionally, for each flowsheet created, the same set of recovery and energy budget objects are created automatically to provide a summary of that specific flowsheet in addition to the global project.
- b. The recovery objects provide a summary of the project inlets, outlets, losses (due to convergence tolerances), and component relative outlet recoveries. The duty and power budgets summarize the heat and power consuming or producing units in the project.
 - c. User defined recovery and energy budget objects may be created to calculate custom information of importance to the user. For example, it is very easy to compute the recovery of components in any number of selected outlets relative to any number of selected inlets by creating a user defined recovery object. The recovery object is utilized in many of the sulfur plant examples to calculate the overall elemental sulfur recovery of the Claus sulfur plant.
9. The Project Viewer in ProMax now allows the dialog for a block or stream to be popped up or torn off from the parent dialog frame allowing for simultaneous viewing of multiple blocks or streams. This Popup capability is especially useful for systems that have multiple monitors. A menu item on the Project Viewer has been added to initiate this feature and to manage the Popup Views.
 10. The distillation column no longer requires complete recalculation to perform column hydraulic calculations for non-kinetic columns.
 11. New packings have been added and changes have been made to incorporate the hydraulic models from Sulzer Chemtech's Sulpak version 3.3. Additional packings include Nutter rings random packing and MellapakPlus structured packing.
 12. After careful review of experimental data and client consultation, BR&E concluded that the prediction of TEG regenerator performance was slightly optimistic in ProMax 1.x and PROSIM. Even though the absorber region was not changed, the performance of the entire unit will obviously be affected due to the regenerator changes. Consequently you should expect the predicted performance of these units to decline slightly in this release. We feel that ProMax can now predict the water residual in TEG to the accuracy of the available experimental data at all temperatures commonly encountered in this process. Please contact us if you have questions concerning this change.
 13. Improvements have been made to MDEA acid gas removal and solution regeneration predictions after a review of available data. The improvements are based on MDEA acid gas equilibrium data which include the following systems: MDEA-H₂O, MDEA-H₂O-H₂S, and MDEA-H₂O-CO₂ from 1959 to 2004. It has been postulated that some of the early experiments with MDEA-H₂O-H₂S and MDEA-H₂O-CO₂ systems may have used impure amine solutions. Because of this and the availability of more recent equilibrium data, the model parameters for the Electrolytic ELR model have been refitted. These modifications result in several changes to the MDEA acid gas predictions with ProMax 2.0 as compared with ProMax 1.x and TSWEET:

- a. Stand alone absorbers show significant increases in the treated gas H₂S content for a constant lean amine acid gas concentration, particularly for inlet streams with little CO₂. Treated gas CO₂ concentrations may be unaffected since CO₂ absorption is primarily limited by kinetic effects. Further, when large amounts of CO₂ are co-absorbed with H₂S, the increase in the calculated H₂S partial pressure is not as pronounced unless the rich approach for H₂S is near 100%.
 - b. Stand alone strippers show lower acid gas concentrations for both acid gases in the lean amine at a fixed steam rate. Again, the effect is much more pronounced for H₂S than for CO₂.
 - c. For complete plant simulations including both absorbers and strippers, the lower residuals from the stripper mitigate, but do not totally eliminate the increase in H₂S concentration in the treated gas product. The increase in the H₂S concentration in the treated gas is usually minor even in cases where no CO₂ is present and decreases as the CO₂ to H₂S ratio increases unless the column is operating near or above equilibrium rich approach.
 - d. The maximum loading for H₂S at a fixed inlet pressure is decreased slightly. Accordingly, care should be taken in those cases where the Rich Approach for H₂S is very close to 100 percent or the Rich Approach was used to determine an amine circulation rate.
14. New specialty property packages include Peng-Robinson vapor model with heat transfer fluid liquid model, Caustic Treating, Amine Sweetening, and Sulfur.
15. The following changes to the NaOH–water system based on experimental data have been made for the Electrolytic and Caustic Treating property packages:
- a. The NaOH–water system is more difficult to thermally regenerate.
 - b. The residuals of methyl and ethyl mercaptan from the bottom of the thermal regeneration tower will be higher relative to previous ProMax predictions for the same duty.
 - c. The NaOH–water liquid density and liquid heat capacity estimations have improved.
16. The individual diatomic hydrogen (H₂) modifications are now present in ProMax. The program includes orthohydrogen, parahydrogen, equilibrium hydrogen, and normal hydrogen. The previous versions of the program only included normal hydrogen. Normal hydrogen is a constant composition mixture of 25% parahydrogen and 75% orthohydrogen. The inclusion of the individual modifications is needed for hydrogen processing. ProMax will accurately predict the equilibrium distribution of para and ortho hydrogen in a Gibbs free energy minimization reactor. If the generic names for diatomic hydrogen (i.e., H₂, Hydrogen) are selected as components, the program will use normal hydrogen as in the past. For most work, normal hydrogen will be the appropriate selection. Please see the online help for more information.
17. Several radicals are available in ProMax 2.0 for high temperature modeling. These include atomic hydrogen (H*), atomic oxygen (O*), atomic sulfur (S), atomic nitrogen (N*), atomic fluorine (F*), atomic chlorine (Cl*), atomic bromine (Br*), atomic iodine

(I*), hydroxyl (O*H), mercapto (HS), imidogen (NH), and amidogen (NH₂). We caution the user to exercise care when selecting components so that these radicals are not accidentally selected when their molecular counterparts are intended (e.g., selecting H* rather than H₂).

18. A tooltip has been added to display component information including formula and CAS registry number in the environment dialog to ensure the proper component is selected.
19. ProMax can now model gas sweetening processes, hydrocarbon absorption processes, and other related processes that utilize the solvent N-Methyl-2-Pyrrolidone (NMP). A common process utilizing this solvent is the Purisol[®] process. BR&E recommends the use of the Peng-Robinson Polar or the SRK Polar package for these applications. Alternatively, a molecular Gibbs excess package such as NRTL may be utilized.
20. More predefined unit sets have been added to ProMax. The program includes two predefined unit sets for the English system, one suitable for gas processing and the other for refining applications. Several new metric system sets have been added to provide various combinations of pressure (bar, kPa, kgf/cm²) and energy units (kJ, kcal). Additionally, more descriptive names replace the Metric1/Metric2 unit sets to assist the user in selecting the appropriate set. The default unit set for new project creation can be changed by modifying the Options.xml file. Please see the help or contact BR&E for assistance.
21. A new combustion stream analysis object has been added to calculate key combustion parameters. These include the amount of oxygen required to stoichiometrically combust a stream, the gross and net heating values, and the Wobbe Index. The combustion analysis is frequently used in conjunction with a specifier to specify the flow rate of air required in burners.
22. Recommended practices for sizing of relief valves, as presented in several published international standards (API RP 520, EN ISO 4126, BS 6759 and A. D. Merkblatt A2), were added as a process stream analysis. These methods are a guide for selection of pressure relief devices for equipment with maximum working pressures exceeding two atmospheres (absolute). Selection of valves from manufacturer data sheets is made via the effective discharge area calculated by this analysis. A valve with an effective area close to but exceeding this value is recommended. The implemented standards suggest final selection be made in consultation with your relief valve manufacturer. The scope of this analysis does not currently include overpressure protection of vessels in fire conditions. This analysis does report estimation of latent heat of vaporization for mixtures and may be applicable to other applications.
23. The distillation curve analysis now calculates ASTM D2887 and EFV curves. Further, the ability to specify a pressure for calculation has been added. If no pressure specification is made, the calculations are made at the standard pressure of the test (1 atm for TBP, D86, EFV and 10 mm Hg for D1160). A normal boiling point threshold can be specified to exclude light components from the distillation curve.

24. Many of the stream analysis objects now allow calculation on a dry basis (neglects water and other polar solvents). These include the distillation curves, fuel properties, phase envelope, and vapor pressure, dew and bubble point analyses. Consequently a hydrocarbon dew point calculation can be made using a dew point analysis on a dry basis.
25. More Visio shapes for unit operations have been added to ProMax. Additionally, a small “Q” is now placed adjacent to connection points that require energy streams. These markers will not appear in the printed output.
26. Distillation column specifications can now be reordered by the user.
27. The lean and rich approach column specification objects have been redesigned to execute much faster.
28. The cross flowsheet connector now calculates and displays any residual error resulting from changes in the physical property packages between flowsheets and warns the user when these changes are significant. The user may alter the warning tolerances if needed in special cases.
29. The geometry properties for all exchanger types including Double Pipe, Shell and Tube, and Fin Fan are now calculated on data entry as much as possible. These geometry properties include exchanger volume and available surface area. Also, the geometry properties are not cleared if process properties are changed. For example if you change the tube outside diameter and the tube wall thickness is specified, ProMax will immediately calculate the tube inside diameter and display it. These changes improve the user experience when working with exchanger rating and plug flow and stirred tank reactors.
30. The overall pressure drop calculated on each side by the heat exchanger rating package can now be used as a measured variable in the solver.
31. Solver grouping. For the root finding problem the Group property allows users to link together Solvers which have no apparent interdependence (as determined by the flowsheet dependency checker) and force them to be solved simultaneously. For the minimization problem the Group property allows the user to specify more variables than there are equations.
32. A “Nonpolar Liquid” column type has been added as an additional method to start difficult columns that do not have a previously stored solution and contain both polar and non-polar compounds. In most cases, the more applicable column type will solve after solving the column using this type.
33. Improvements to transport property prediction of amine solutions have been made.

- 34. A bug in separator sizing that caused the program to crash when no liquid was present in the feed has been fixed.
- 35. Multiselect move and reorder is available for list controls such as components in the environment and process stream properties in the project options.
- 36. Constant pressure heat capacity calculations for the electrolytic models have been improved.
- 37. Moniker items can be used in the property tables.
- 38. Various items in crude oil characterization have been improved.
- 39. A real gas C_v calculation method allows the C_p / C_v ratio for non-ideal gases to be determined.

Support and Contact Information

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