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Control Simulator 8 Revision List

Guide to releases of CS8 and updates to the software.

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1. SUMMARY OF RELEASE FEATURES

The release numbers are associated with revision numbers for the Graphic User Interface (GUI) and for the Compute Engine. Changes made in each release are listed starting with Release 6. Major functional changes are listed in this section. Detailed changes for the user interface are included in section 2, while detailed changes to the compute engine are in section 3.

Look at the release date and do not download software with a release date after your maintenance expiration date. You can see the date on the splash screen when CS8 starts, or by selecting Help/About from the main menu. Contact Interlink Systems, inc. to extend your maintenance period.

1.1 Release 12 – BETA 3   G8.072   E 8.074   9 Sept 2015

This release has major changes that allow a looped supply system and a much expanded return line system. It also allows placing the HPU below sea level. Several obscure, bugs were fixed including one that could make big errors when fluid viscosity is allowed to vary with pressure.

BETA 1
Moved code to latest Delphi compiler. Added support for multiple input line connections on a manifold device. This makes possible looped redundant supplies, bomnining supply lines of different sizes, and a complete-field return line system.

BETA 2
Made new file format compatible with the older one.

Found and fixed a bug that would in rare circumstances print the wrong pressure for dP in the input restriction for input line 1. This was an output problem only, not affecting the acciuracy of anything else.

Pn, dPin, and dPout for manifolds had the wrong pressure unit in the column headings. They were calculated using the pressure unit selected for the device, but the default project unit appeared in the heading. This was fixed.

Found and fixed a bug that can cause large errors in the case of 1) fluid viscosity varies with pressure, AND 2) a restriction at either end of a line has a large pressure drop, AND 3) the drop in the tubing part of that restriction is dominant.

BETA 3
The "Disregard bore pressure" check box in the library valve model was ignored. This was fixed.

The pressure unit called for by the operator for the Source HPU or the simple pressure source was ignored. The code used the project default pressure unit instead. This was fixed.

Putting the HPU under water by giving it a negative height did not work right because the control fluid head was completely wrong. This was revised and fixed.

To download Release 12, use this link: http://www.mcadams.info/dist/setup_cs8-b3.exe

1.2 Release 11   G8.069   E8.070   16 Mar 2015

Fixed several cosmetic bugs and range checking issues.

Found and fixed bug that could allow a valve piston with zero area and another that would compute the area of the piston incorrectly in some rare cases. **This could cause wrong answers. See section 2.1 for details.**

Added an option for the list of case names to be in alphabetical order.

Found and fixed a rarely encountered bug that would allow extrapolation to negative viscosity at high pressures, understandably resulting in very bad model behavior.

Found and fixed a bug that would sometimes disallow a unit of measure that should actually be acceptable.

Added the ability for the HPU regulator to vary pressure with time.

Added triggers to allow each individual DCV to have its own dropout pressure.

Added the ability to repeatedly actuate a valve. This is especially useful in stepping a choke.

Changed the Open Case dialog box to allow selecting multiple cases, opening more than one case at a time. It also allows deleting multiple cases instead of forcing you to open and then delete them one at a time.

To download Release 11, use this link: http://www.mcadamsengineering/CS8_11.zip

1.3 Release 10   G8.060   E8.066   8 Mar 2013

Fixed various obscure errors having to do with names, display, and numeric entry.

Added the ability to include a return line on the valve module vent port. At the moment, this return line can only go to a simple discharge device. Return lines cannot be manifolded.

Implemented new nonlinear equation solvers that are less likely to get stuck when handling complex models with lots of valves on each manifold.

To download Release 10, use this link: http://www.mcadamsengineering/CS8_10.zip

1.4 Release 9   G8.053   E8.060   1 June 2012

This was actually released 2 Dec 2012, but is dated 1 June 2012 to allow the bug fixes to work with earlier maintenance licenses.

Various operator interface bugs were fixed having to do with case names, device names, range limits, device visibility, etc.

Added the ability to have a temperature gradient along the length of an umbilical.

Added the ability to import library components from another project (this new feature requires a maintenance license that is good until 2 Dec 2012 or after).

   Added code to output a header file for the timing component. It contains information on the time step and on the total execution time. You get it by right clicking the time component (it looks like a clock on the case window).

A number of tiny, unlikely, but bothersome bugs were fixed that would cause the equation solvers to stick (Compute Engine would freeze up) while seemingly unimportant changes to input data would allow the system to run fine.

To download Release 9, use this link: http://www.mcadamsengineering/CS8_9.zip

1.5 Release 8   G8.046   E8.056   10 Oct 2011

Added the capability to have a pressure vs. time function applied as the back pressure for a simple orifice discharge. This allows a more useful simulation of chemical injection cases.

Release 8 fixes a bug that can cause the Compute Engine to immediately crash every time it is run. If this bug bites you, the user interface will work fine, but you will not be able to run any

simulations. I do not have any work-around for it. Because of this, I recommend that you update to Release 8.

To download Release 8 use this link: http://www.mcadamsengineering/CS8_8.zip

1.6 Release 7   G8.043   E8.051   26 May 2011

Revised the valve spring so that it can now imitate the force while a shear ram is shearing as well as the nonlinear rubber compression in an annular preventer. Introduced new splash screen.

If you need this version, use link: http:// www.mcadamsengineering/CS8_7.zip

1.7 Release 6   G8.042   E8.048   21 Apr 2011

Release 6 is the first with an automated installation program. It is also the introduction of the full pump accumulator source, allowing multiple pumps and main umbilicals as well as accumulators.

The accompanying example projects were revised so that there are example problems, but there are also "validation" projects that plot CS8 results against measured test data and against output from the earlier CSI program. A CSI database is included so if you have CSI, you can run the validation cases yourself.

If you need this version, use link: http:// www.mcadamsengineering/CS8_6.zip

1.8 Release 5   G8.033   E8.038   19 Sep 2010

Release 5 is the first release not referred to as Beta. It is obsolete. You should download Release 7 or later instead.

2. GRAPHICAL USER INTERFACE ENHANCEMENTS AND BUG FIXES

2.1 Release 11

8.069 - 17 Mar 2015
   Added the option for the case name list to be in alphabetical order.

8.068 - 2 Sep 2014
   In the plotter, the code to check if the selected X and Y engineering units were "allowed units" did not check correctly and would reject some valid units.. This was fixed.

8.067 - 28 Aug 2014
   Added to valve editor the ability to specify a repeat count and period. When a valve repeats, it is moved to its starting position without any flow of fluid. This can simulate moving two identical valves, one after the other, or to step a choke operator.

   Did more testing of the triggers (old and new).

8.066 - 27 August 2014
   In the manifold editor I added provisions for a second Low Pressure Trigger. This matches with the changes made to the compute engine.

   Added provision for each valve to have its own DCV dropout trigger.

8.065 - 16 April 2014
   There was no range checking on the library fluid object. I added an extensive range check to all fields to make sure the entered values are proper and realistic.

8.064 - 30 Jan 2014
   In the library Valve Editor, setting the number of points did not update the pull down list. This was fixed.

8.063 - 18 Jan 2014
   Fixed the procedure ReadToScreenGrid so that it recognizes and properly identifies txt files that are not made by CSI and does not try to convert them from CSI to csv format.

8.062 - 15 Jan 2014
   Added a routine to scan for any case names that have leading or trailing spaces. Those could have been formed in the presence of earlier bugs and

could not be deleted or renamed.

    Changed the Open case selection dialog to be a multi select form so you can open more than one case at a time.

    Added a new Delete Via Case-List that uses the new multi select function to delete cases. This allows deleting many cases at one time without opening each one.

    You could not set a trigger for a valve if the case name had a - in it. This was fixed.

8.061 - 3 Aug 2013
    NOTE: If you entered valve rod size as an area, but the piston was a diameter, the resulting piston area was too small. If you ten also enter the piston stroke rather than its volume, the resulting volume and stroke time will be too small and the effects of bore pressure and depth head will be off. If both were entered as diameter, or both entered as area, then the piston area was OK and the simulation would be correct.

    Rod was not allowed to have more area than the piston. This allows a piston area of zero. The check should be that the rod is a smaller diameter than the piston. There was no check at all on the size of stem. Fixed.

    Fixed a bug relating to handling of invalid units when more than one type of unit is allowed.

    Changed the tab order of the fields in the valve library editor to be more rational.

2.2 Release 10

8.060 – 8 Mar 2013
    The plotter was limited to plotting files with up to 20 columns. I extended it to allow 30 columns of data.

8.059 – 13 Feb 2013
    Valve functional names and valves themselves with the name "Header" caused naming conflicts and their output files would not appear in any pull down list. This was fixed for valve functional names and a valve itself is no longer allowed to be named "Header".

    Two valve modules with identical names caused a file name conflict when running the compute engine. You are no longer allowed to give two valve modules the same functional name.

8.058 – 2 Feb 2013
   A file not found error box associated with viewing the numeric table of data for a plot did not identify the name of the file. Fixed.

8.057 – 16 Jan 2013
   Finished adding code to allow a vent line to be attached to a valve module vent port.

   Changing the number of output connections on a manifold and then immediately changing back to a smaller number would create a range check error. Fixed.

8.056 – 15 Jan 2013
   The simple orifice source resistance name field was too short for some users. I lengthened it.

   If a case window was left scrolled to some place other than the top left corner when it was closed, the positions of all devices got messed up. It now restores the scroll state properly.

8.054 - 7 Dec 2012
   In 8.051 I made a change to the range limits for Dp and the Stroke that caused great trouble when trying to switch between a length and an area or volume value. Fixed.

2.3 Release 9

8.053 - 1 Dec 2012
   Sometimes changing monitors allowed devices to be off screen to the left or top with no way to retrieve or edit them. This was fixed.

   Added code to allow importing library components from another project. In the case of name collision with parameter mismatch, the incoming component is renamed to something unique. This feature requires a maintenance date of 2 Dec 2012 or later.

8.052 - 25 Sep 2012
   Any case name with two spaces or ~ in it became impossible to open. This was fixed.
   In device names ' ~ ' was simply deleted since it is not allowed in a device name. this left extra white space and changed the user's intent. The program now replaces ~ with the similar-looking hyphen (-).
   Leading or trailing spaced in a device name could not be deleted. This was fixed.

8.051 - 8 Feb 2012
   Zero was allowed for piston dia or area and for stroke in a valve. They should have a lower limit that is >0. This was fixed.

8.050 - 29 Nov 2011

The valve edit form described reference bore pressure as gauge relative to sea. But
The compute engine and the technical manual treat it as absolute. I changed
the form to conform to the code and manual.

8.049 - 27 Nov 2011
   Modified the right click on a line device to allow reading the line final condition file in
notepad, and also added a right click to the time device to see the new timing parameters file.

8.048 - 28-31 Oct 2011
   Added code to support a temperature gradient along the lines.

8.047 - 27 Oct 2011
   If you left the plot window open while running new simulations, and you had moved the plot
it would keep jumping back to the same location it was at when it was last closed. I fixed that
so it always stays where it is put.

2.4 Release 8

8.046 - 7 Oct 2011
   Minor changes to the splash screen: removed the minimize and restore icons, and rearranged
the list of dates.

8.045 - 25 Sep 2011
   The valve spring curve plot was not displaying correctly and the hints and explanations were
bad. I fixed the plot and improved the hints.

8.044 - 14 Aug 2011
   On multi-monitor system, a new case file could be created outside of the boundary of the
parent form. This was corrected.

2.5 Release 7

8.043 - 25 May 2011
   Fixed a mysterious range check error that occurred when trying to define a single pump in an
HPU when there are more than one main umbilical.

2.6 Release 6

8.042 - 21 April 2011
   Make an Open Examples item on the Files menu.

8.041 - 1 April 2011

Fixed a problem that returned a ToolTag = 0 error when reading a file.

8.040 - 10 Mar 2011
   Fixed error that did not write initial pump state to the project file.
   Changed default accumulator state to 0 gal instead of 0 psi.
   Added ability to drag connections on the outlet side of a device to allow ou to rearrange the connections without deleting and redrawing.
   Added a warning to the change of number of connection in case you are about to disconnect a device. This applies to HPU's and Manifolds.
   Changed the code so that no two library components can have the same name even components that differ in type. This fixed a problem with false positives in the "Where Used" function.
   Made it where you cannot call up the plot or the numerical table for a plot until the simulation is finished. Otherwise, reading from the data file fails.
   Added code to clone a valve in a valve module and to rearrange the list (Move Up and Down).

8.039 - 4 Mar 2011
   Removed extraneous button from the valve editor form.
   Added the two manuals to the Help main menu item.

8.038 - 1 Mar 2011
   Added code to detect lack of the key 'PrintResistanceDetails' and put a default value in the file to avoid an error message.

8.037 - 25 Jan 2011
   Added code to show the data in the plot device as a table of numeric vales. This approximates the content of the old CS4 or CSI output files, but with additional flexibility.
   6 Feb 2011
   Added the Browse button to the trace file name in the plot editor. This is clearer and more "widows-like" than double clicking the edit field. The double click still works as it always did.
   8 Feb 2011
   Added a check box for Use Pressure Regulator on the output lines of the HPU.
   Clone case window did not necessarily have the same width and height as the original. This was fixed.
   Plots did not have a caption. I fixed this.
   9 Feb 2011
   Added accumulator to the HPU. Added function name to HPU. Fixed bug in viewing all output files for the HPU.

8.036 - 3 December 2010
   Added selection check box for resistance details in the valve module of a tree.
   Fixed hint on the time delay to add to all valves in the valve module.

8.035 - 3 November 2010
   Removed the low sticking friction field from the Valve Forces tab. It cannot be entered by the operator and the value displayed (0 psi) was wrong and therefore misleading.

8.034 - 29 October 2010
   Reenabled the pump on the toolbar to continue development.
   QtyPumps was not being written to the CE file. Fixed.

3. COMPUTE ENGINE ENHANCEMENTS AND BUG FIXES

3.1 Release 11

8.070 - 16 Mar 2015
   Added a forced print when a repeating valve resets to make the plot more accurate.

8.069 - 22 Aug 2014
   Added a second trigger for low pressure to the Discharge_Orifice. Altered Discharge_Tree to set the second low pressure trigger. Added an individual trigger for DCV dropout behavior to the Valve. If this trigger is defined, it overrides the global DCV dropout trigger on the manifold. The purpose is to allow one or more valves to drop out at a higher pressure than the tree as a whole.

   Added the ability to repeatedly actuate a valve for a specific number of actuations. See section 2.1 for more details.

8.068 - 16 April 2014
   In Tfluid.Viscosity, high pressure with $dVdP < 0$ was found to produce negative viscosity, resulting in negative Re. Needless to say, this caused a problem. To avoid this problem extrapolation is prohibited now.

8.067 - 21 Jan 2014
   Added the ability to set regulator pressure from a file in the pump/accumulator source so that pressure can vary with time.

3.2 Release 10

8.066 - 11 Feb 2013
   Brent's solver was robust but about 1/2 the speed of the secant solver.
I implemented a combination solver that achieves the speed of the secant solver with the robustness of Brent's solver.

8.065 - 9 Feb 2013
   Implemented Brent's Solver to overcome some of the sticking problems (failure to completely converge) encountered in certain models.

8.064 - 23 Jan 2013
   For the low pressure dropout trigger pressure, the unit was getting trashed so the code never added in the subsea head to convert to an absolute pressure. Fixed.

For "display purposes" I now arbitrarily set the valve position to 0% or 100% on DCV dropout depending on the preload vs full load. Previously, the valve was left in mid stroke.

8.063 - 17 Jan 2013
  Improved the way the Hardy Cross solver reports on problems with simulations having troublesome models.

8.062 - 16 Jan 2013
  Licensing error problem was fixed.

8.061 - 13 Dec 2012
  Added provisions for a single return line attached to the vent port of the valve module.

3.3 Release 9

8.060 - 18 Jan 2012
  Removed discontinuities from the valve model making it more stable.

8.059 - 13-14 Dec 2011
  I upgraded the model for restrictions especially for low flow, making the model more stable.

8.058 - 15 Nov 2011
  Found and fixed several bugs that caused the solvers to stick (fail to converge) in specific cases. When it converges, it converges to the right answer, but tiny discontinuities in the equations could cause convergence to fail, particularly at very low flow. The discontinuities were removed.

8.057 - 31 Oct 2011
  Added code to compute friction factor using a temperature gradient over the length of the lines.
  Fixed a bug that caused the input flow to be wrong in a line fed by the pump/accu unit, but only in the case of very small Cv.

3.4 Release 8

8.056 – 10 Oct 2011
  Found and fixed a bug in the interpolations of the back pressure file that caused glitches occasionally.

8.054 - 29 Sep 2011

Found a memory allocation error that could cause the Compute Engine to crash with a frustrating bleep. This was fixed.

8.053a - 22-23 July 2011

Solutions would occasionally stick; the simulation would simply stop, requiring the program to be shut down to recover. I implemented an improved solver for the ends of the long lines and tightened up the accuracy of the friction factor solver. This resolved all known problems.

Found that the code did not properly calculate flow for multiple lines. Fixed.

3.5 Release 7

8.051 - 26 May 2011

Added new splash screen.

8.050 - 5 May 2011

Changed valve spring code to allow reading a spring curve with uneven point spacing. This makes it possible to use the "spring" to reproduce a measured shear force is a blind or casing shear ram.

8.049 - 27 Mar 2011

Fixed an occasional divide by zero error in the solver for the tree discharge device.

Node dPin and Qin (output variables) were not getting set in the tree model. I added code to do so.

Tree solver no longer put out the Cv of the vent orifice. This is now fixed.

3.6 Release 6

8.048 - 16 Mar 2011

For the tree discharge, it did not set the output variables for line flow and line pressure at the discharge end of the line. The code had been left out when I implemented the new solver. The code was added back in.

8.047 - 15 Mar 2011

Increased max reaches to 5000. That will accommodate a 200:1 length ratio between long and short lines.

8.046 - 28 Feb 2011

More components converted to the linearized version..

Found that my regulator in the HPU was broken. Fixed it.

8.045 - 26/27 Feb 2011

Finally found that nonlinear solver ability to always converge was being compromised by the equation for an orifice (of the form $kQ^2/Cv^2 = dP$) which has zero slope at zero flow. Introducing a tiny linear factor on top of the quadratic one guarantees convergence while introducing negligible error.

DCV header restriction, vent outlet restriction and accumulator restrictions were all changed to the new linearized version.

8.044 - 22 Feb 2011
  Improved the convergence and accuracy of one of the nonlinear solvers.

8.043 - 21 Feb 2011
  Changed Colebrook to only do one Newton's method step, starting with the Haaland relation as an initial estimate. A coefficient in the Colebrook equation was changed slightly to improve match with the real Colebrook relation at low Reynolds's numbers. This was done to decrease uncertainty and non-monotonicity in the final friction factor with respect to Re and to improve speed.

8.042 - 10 Feb 2011
  Revised and finished the Source_HPU model.

8.041 - 3 Dec 2010
  Added more outputs for a demanding client

8.040 - 19 Nov 2010
  Added to the valve output file columns for dP for the inlet and outlet restrictions.
  Added new output files showing pressure drop details for each segment in the valve inlet and outlet restrictions.

8.039 - 5 Nov 2010
  Further work on pumps.
  Activated the DisregardDepth and DisregardBore check marks.