CANUTE

FHC

Hydraulic calculation software for
water based fire protection systems

A tutorial to getting started with FHC

Canute LLP
Flaxton House
Greenmount Terrace
Beeston
Leeds
LS11 6BX
Tel: 0113 277 4499
Fax 0113 276 0309
Email info@canutesoft.com
Web www.canutesoft.com

British Automatic Sprinkler Association
basa

CANUTE

Tutorial to getting started with FHC

The FHC program is for the hydraulics analysis of water based fire protection systems including sprinklers, deluge, water mist and more… This is a short tutorial is design to help you in learning some of the basic concepts. If you are using the Evaluation copy of the program we trust that these notes will assist your technical review and evaluation of this innovative software package.

They are quite long so if you are not too familiar with using Windows computers, you may want to click on the 'Printout' button below to have these notes on paper so that you can work though the various options and tasks that FHC can assist in the full hydraulic calculation of sprinkler and water spray systems.

This special 'evaluation' version of FHC permits you to examine the various examples supplied, and to add to or amend these as you choose, to calculate and print them out but the pipe sizes might not be as entered and the word 'Demonstration' will be given on the results printouts. However, don't be alarmed if the source duties quoted by the program appear too high or too low - the full FHC program will calculate your systems correctly and your name and address will be given on all the screens. For further information, click on the 'Printout Order Form' below or from the 'Options' menu given on the next screen. Once you click on 'OK' here, the main picture screen of FHC will be displayed, initially blank but containing the menus described below :-

'File' - to enter a 'New' project, 'Open' an existing data file or ***'Quickest'*** for the grid estimate part as described later or to 'Exit' from the program when complete. If you come back to this menu after a job has been read in or entered, some additional options of 'Last' to open the last file amended, 'Save' to update the current file, 'Save As' to copy the file to another name or place and 'Printout' to get a quick confirmation of the data entered so far for records.

'Edit' - will be blank to start with but then used to add to or amend the project, water supply, design area, head codes and nodes/pipes information.

'Drawing' - again blank to begin as there isn't a picture yet on the screen but will allow you to 'Add' a new pipe, 'Break' an existing pipe in two, 'Delete' one or more pipes from your network, 'Edit' the details on any selected pipe, two 'Global' change options that I will describe later, to 'Renumber' or 'Resequence' the node numbers used to identify your pipes and finally, to 'View' the input data (and calculated results when done) on any pipe that you 'click' on.

'Calculate' - just click here and select the 3rd option when valid to check over and begin the hydraulic calculations for all the pipes and heads / nozzles on your project. A 'dialog' box will be given in the centre of the screen quoting the current check limits on velocity and pressure drop so just click on 'OK' to proceed - see descriptions later.

'Results' - menu will only be active after the 'sums' have been done and it allows you to view the 'Heads' summary, a similar one for 'Pipes' and the 'Check' and 'Calculate' summaries which give comprehensive statistics on your system. The 3D DXF file is not available in this demonstration version.

The **'Printout'** menu can be used, again after the calculations are complete to obtain the full results presentation.

'View' will allow alternative views and displays of all or part of your pipework system - plans, elevations and 4 isometrics from each corner of your building and can switch on or off the display of the pipe sizes as different colours or the node numbers at the pipe ends.

Various **'Options'** are supplied for 'housekeeping' duties and not of much relevance to your current use.

'Help' gives most of the supplied user manual on the screen with various search options so you can refer to the associated part if you have a problem.

TO BEGIN USING FHC

1) Click on 'OK' below.

2) When the full blank picture screen is given, you may either click on the 'two boxes' symbol on the top right to adjust the screen size with your mouse (not too small though!) or leave it full screen.

3) Click on **'File'** at the top left and then on **'Open'**.

4) Select and open the 'examples' folder, you will find a number of 'test' files in it which you may like to examine. However for now select the **'LPCGRID'** and press the open button'.

5) After a few seconds (depending on the speed of your computer), the plan of the small gridded sprinkler system (page 114 of the LPC Rules) will be shown and some of the menu displays on the top line will now become available.

6) Click on **'View'** and then on **'Front elevation'** to see the roof arrangement of pipework.

7) Click on **'View'** again but this time select one of the 4 isometric views to see the pipework from that direction. This is one of the main features of FHC - you can 'see' directly what your system looks like as a 3D drawing, not as a collection of node numbers, sizes, lengths etc.

8) Try out all the 'View's and can select other 'text' items with the box on the top right of the screen - they might be a bit cramped on the full view though - so click on **'View'** and **'Zoom'** to get the display to switch to a plan view, position your mouse somewhere about the bottom left hand corner of the array of sprinkler heads, hold its button down and slide the mouse over to the top right of the group of heads, drawing out a red square / rectangle and then release the mouse button.
9) A higher scale plan of just what you have selected will be drawn with 8 **'pan'** buttons at the 4 corners / edges of your screen. You can 'click' on any of these to move the view in that direction at the same scale or click on 'View' again and then one of the isometric

views to see the 3D co-ordinates of the pipework all lining up. Perhaps switching on the node numbers now will show them better than before.

10) Move your mouse over the centre of one of the pipes and 'click' its button - a separate display will be given on the top left of your screen (which can be moved by clicking on its blue title and sliding the mouse and outline to another position on the display). Here the details about that pipe will be given so click on the 'scroll bars' to see more information or any of the 4 buttons to see the 'Previous', 'Upstream', 'Next' pipes and note that the yellow line and data display will move accordingly or 'Return to drawing' will do just that.

11) Now click on **'Edit'** on the top left and wait until the 5 page dialog box is given - clicking on the first 3 tabs **'Project'**, **'Water supply'** and **'Design Area'** will show you the way those essential items are entered (there is no need to change any of them now). The 'Head codes' part shows the way that different head / nozzle sizes are entered for subsequent selection.

12) When finished, click on **'Apply'** or **'Cancel'** (or the 'Print Input data' one if you want) to return to the picture display.

13) Click on **'Calculate'** and 'All heads given to be operating' to get a dialog box in the centre of the screen showing the current minimum / maximum velocities and maximum pressure drop per pipe values and two buttons labelled **'OK'** and **'Cancel'**.

14) Click on **'OK'** and another display will come up *(only in this evaluation version showing what pipes have been changed in size)*. Click on **'OK'** to clear this dialog box.

15) Depending on the speed of your computer, you may see a *'One moment please...'* message and then one or more displays quoting the pipes over the maximum water velocities and pressure drops so defined in step 13 - click on 'OK' *(or press the 'Enter' key)* to continue.

16) The **'Calculations Summary'** is then given and it is worth spending a few seconds reviewing the display *(clicking the mouse on the scroll bars or pressing **'PgDn'** or **'PgUp'** keys to see more of it)* before pressing **'OK'** to clear it or 'Print' if you want a hard copy. Don't worry if the source duty appears very high or low - remember the program varied some of your pipe sizes so some of these might have been critical. At least it shows that my program can cope with vastly unbalanced pipework systems.

17) Now the two menu options **'Results'** and **'Printout'** will be available and if you click on one of the pipes, you will see its input data as well as the calculated flows, pressures etc. as seen in step 10 or you can click on any of the 'View' options, even zooming in if needed, to see the 4 most remotest heads shown in red on the screen. Any pipes shown in red are beyond your specified velocity / pressure drop limits.

18) Click on **'Results'** and then **'Heads Summary'** - the data and calculated values for all your heads will be shown under various headings - try *'clicking'* on some of these to see the minimum / maximum values sorted into order and I don't expect to tell you now how to see more items with the scroll bars. Click on 'OK' when satisfied that this information will be of considerable interest to you on your real projects.

19) Click on **'Results'** and **'Pipes Summary'** this time to get a similar display but for all the pipes on this job - again clicking on the headings will sort that column into ascending order - click on 'OK' when done.

20) You can either click on the remaining options in the **'Results'** menu or click on **'Printout'**. A new dialog box will be given with its description in the yellow box. Now ensure your printer is connected, is *'on'* and has some paper in it and click on **'Start'** or **'Cancel'** if you don't want to do this task now. Your printer should start up and depending on its speed and memory, 7 pages should be generated being the full results presentation for this project.

21) You may have to wait just a few seconds until this finishes but a display needs clicking on *(or pressing 'Enter')* to see your drawing again. If you are using the Evaluation copy of FHC the word *'demonstratio*n' will be printed on each page of the report

22) Perhaps you want to see some of the **'Drawing'** options in action or are limited in time and so just to go back to step 3 and select one of the other test jobs and repeat some or most of the steps 4 to

21) again or 'Exit' the program.

23) Assuming the ***LPCGRID*** job is on the screen, select a **'Plan'** view and then from the **'Drawing'** menu choose **'Edit'**.

24) Move your mouse onto the centre of one of the range pipes and click its button. A large dialog box will be given confirming the start / end node numbers of your selected pipe and all its information, some items will be zero or blank if not applicable. I assume you are familiar with 'combo' and 'list' boxes (if not just try clicking on the various boxes and buttons on their right hand sides - it doesn't matter if you inadvertently change something you don't mean to at this stage - just click on 'Cancel' to reshow your picture) so try changing the pipe size or type - it is best not to vary the length or direction unless you want to see what assorted messages you get when you put in some obviously 'wrong' information on the drawing. You can always click on 'File' and 'Open' the same file again and decline the offer to save the data that has changed.

25) Click on 'Apply' to redo the checking and screen display or 'Cancel' if nothing altered and then click on 'Drawing' again but this time, select 'Delete' if feeling adventurous. Again move the mouse to a suitable mains or range pipe and click. The pipes that this pipe supplies will be shown in red and a dialog box telling you how many pipes are affected - click on 'No' - don't delete for now unless you really want to erase those pipes / heads and try calculating again!

25) Click on 'Drawing' and then 'Global' changes to see a multipage box - try clicking on the various tabs and options if you want to make some general changes to your job and then 'Cancel' when complete.

26) The next option on the 'Drawing' menu just brings up the same dialog box as above but you need to have selected the pipes / heads in plan view, just like zooming in (see

step 8). There is no reason to vary the information but no harm will come if you make any changes to the data - if you turn off all the sprinkler heads the program will just tell you so and refuse to do any calculations until some heads are added.

27) If you want to renumber an existing node number, select the 'Drawing' menu option and then 'Renumber'. Point to the pipe end that you want to select and press the mouse button - a small box with its yellow help message will be shown. Either type in a new number in the range of 1 to 9999 (or just to be crafty, put in one you know already exists like 100) and click on 'OK' or on 'Cancel' to get back to your picture.

28) The next option on the 'Drawing' menu is called 'Resequence' and allows you to renumber the whole system, say starting at 100 in steps of 10 (or from 456 in steps of 43 if you want or even 9754 down in steps of -76!) if many changes have been made.

29) We haven't covered the 'Add a pipe' and 'Break a pipe in two' options from the 'Drawing' menu because this gridded system is complete but these two are used extensively to repeatedly add pipes / heads to your system as you create it or to insert a new node number somewhere along an existing pipe where one or more new pipes are needed.

30) Naturally I could go on and on now about what FHC can do and give the exact commands for reviewing, adding, amending and deleting pipes to form your complete design area but hopefully now you will have grasped some of the features and procedures in my program.

31) The key to FHC is the visual feedback you get from each addition or change to your system that you make. If you have a pipe going North with a head and the end and then connect another pipe going vertically or to the East, South or West then the program will generate a warning message as you cannot get such a fitting. If you change a pipe type from MW to HW then the drawing will get redrawn but will look exactly the same as no variation as taken place to the x, y and z co-ordinates.

32) The only drawback to such a visual system is that some extra pipes may be needed over the previous SPRINKLE / SPRAY programs (or others offered by different suppliers) ie. for a gridded range, FHC will need a minimum of 4 pipes (from main to elbow, then to roof apex, then to elbow on other side before connecting to the other main) whereas this could have been called one pipe in these other programs (but did you get the actual pipe lengths right? One never knew because these programs had no way of checking that the lengths and fittings were correct).

33) Entering the horizontal pipe length and direction / slope for FHC is usually far easier than calculating the actual sloping length and static change and then possibly typing in the wrong values and spending ages trying to get rid of 0.1m static error in the loops. By the way, FHC doesn't need these either as well as working out where the elbows and tees are!