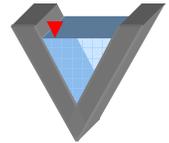




Innovative Hydraulics

Software Development



Visual
Hydraulics

Visual Hydraulics Example I – Visual Hydraulics Project Properties

One of the keys to effective software is the ability of the software to be flexible to the user. Different users have different needs, and so do different projects. Visual Hydraulics has been designed to be as flexible as possible, with various options that allow the user to tailor make Visual Hydraulics to meet the needs of that particular project. This example looks at using/manipulating the various project properties within the software.

Problem: A client on a particular project has concerns with the hydraulic analysis of pipe sections within the hydraulic profile, and has some unique fittings that are typically not part of any standard pipe fitting database. Because the hydraulics are so tight, testing has been done and the client wishes to use the following K values for certain fittings:

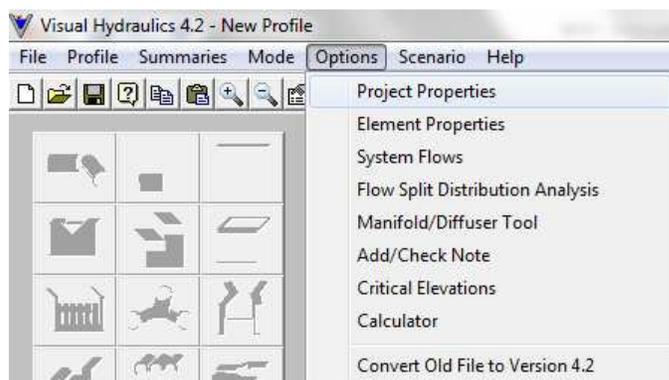
90 degree bend – 0.27
45 degree bend – 0.22
Gate value – 0.24
Swing check valve – 2.85

In addition to the K values, the client's system has the following pipe fittings which have K values provided by the manufacturer:

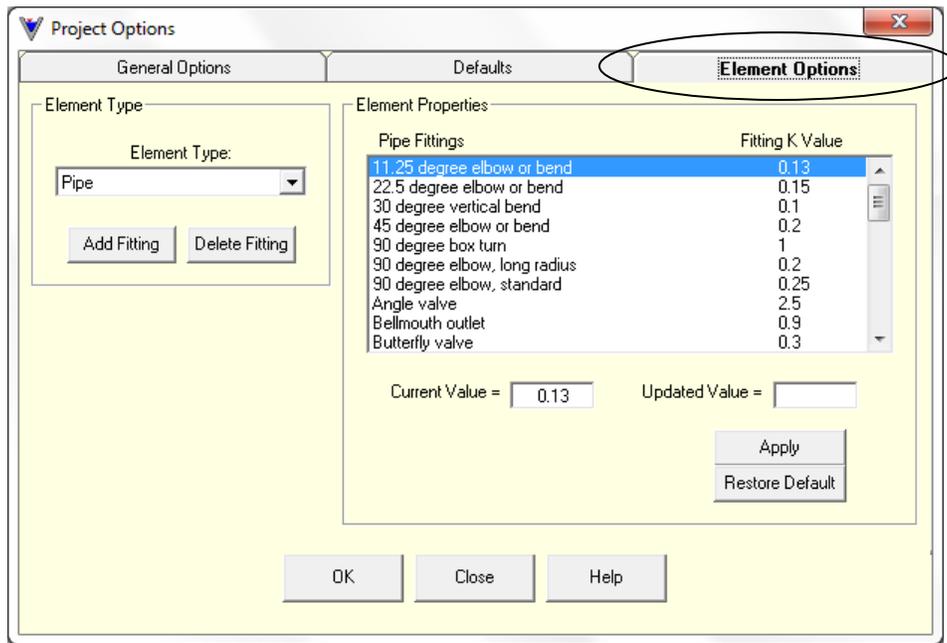
Reducing 90 degree bend – 0.45
Flanged side outlet bend – 0.65

The client has asked that the hydraulic profile be analyzed to include pipe sections with the required K values and specialty fittings.

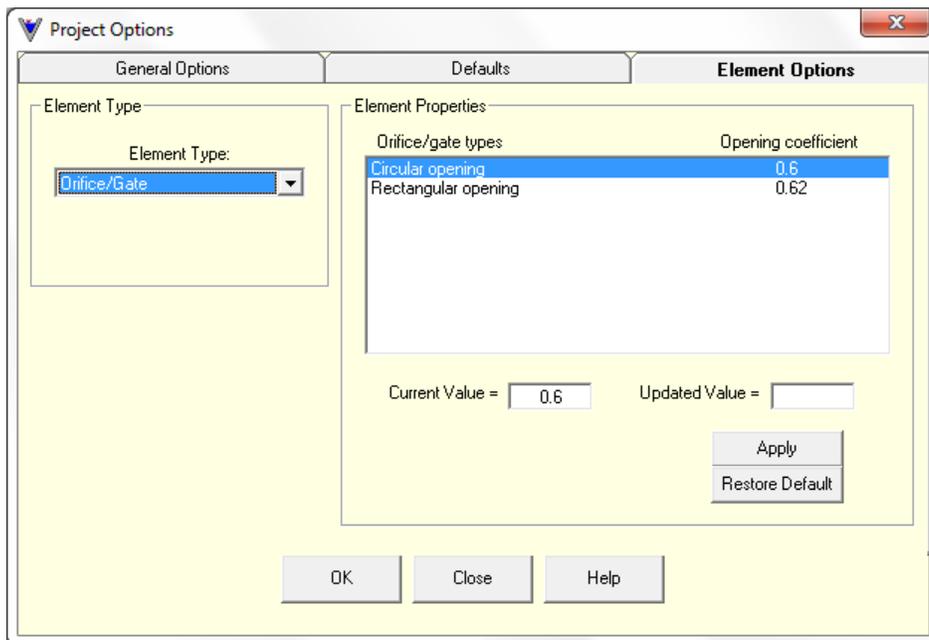
Innovative Hydraulics recognizes that hydraulic analysis is not an exact science, and that modifications to the various factors utilized in certain calculations may be required. On the Visual Hydraulics main screen drop down menu, there is an "Options" menu item:



When the user selects the “Project Properties” option from the “Options” drop down menu, the project properties form is then displayed:



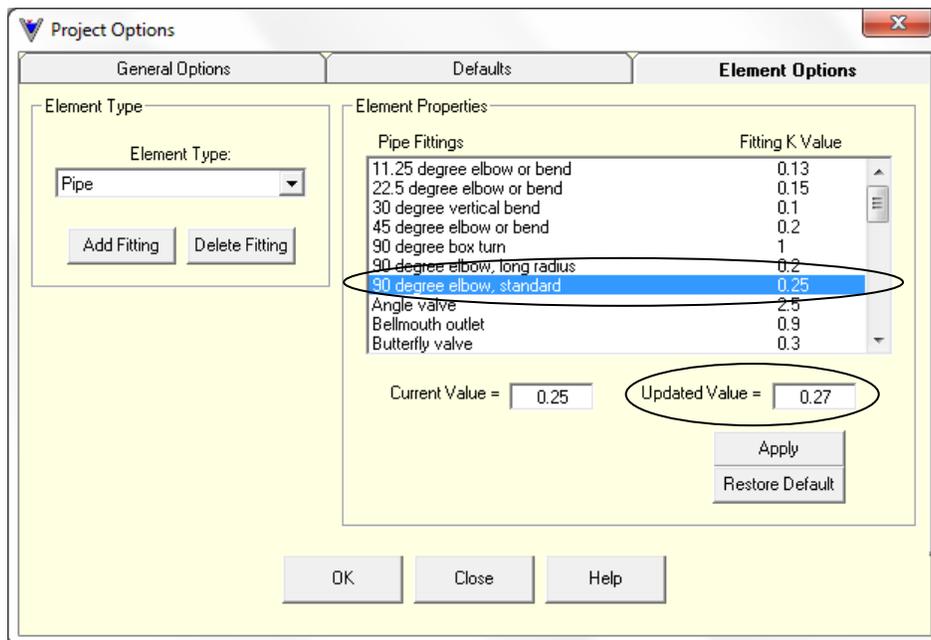
If the user selects the “Element Options” tab on the top of the form, the properties that can be altered for the various hydraulic elements within Visual Hydraulics will be displayed. On the form above, the element type that has been selected is a “Pipe”, therefore the properties for the pipe are displayed. If the user selects a different element, such as the “Orifice/Gate” element, the properties for that element are then displayed:



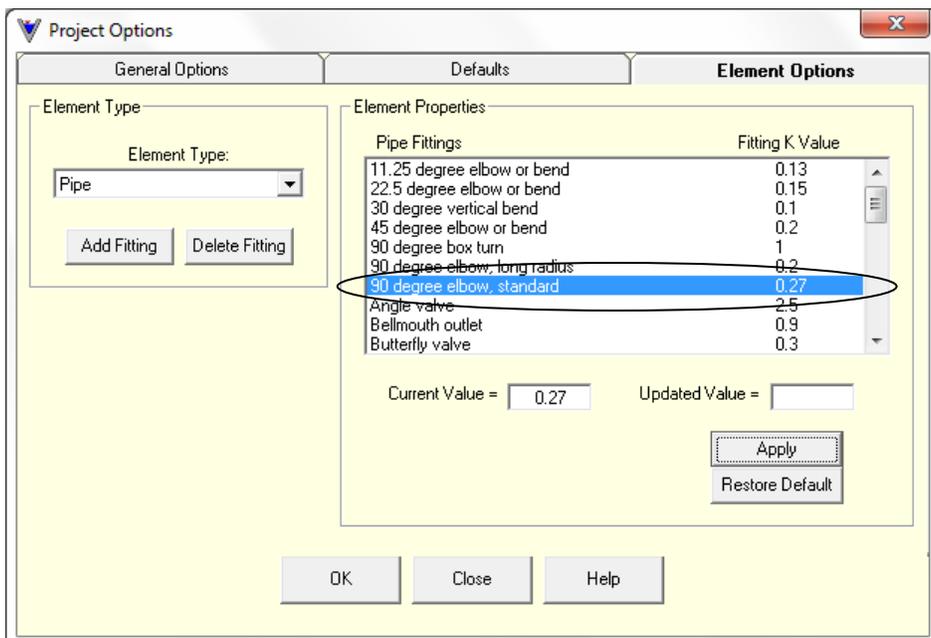
Going back to the pipe element, the user can now tailor make the pipe K fitting database within the software to match the needs of the client. In looking at the current database, the following K values are being used by the software for the pipe fittings of concern to the client:

- 90 degree bend – 0.25
- 45 degree bend – 0.2
- Gate value – 0.19
- Swing check valve – 2.5

These values vary slightly from the values desired by the client, so they should be changed. This can be done easily by highlighting the fitting in question, and then providing the desired K value in the box provided:



When the user provides the desired K value and hits the “Apply” button, the K value database is updated:



This can be done for all four fittings so that the appropriate K value can be utilized. It should be noted that the user can revert to the original fitting K value stored in the program at any time simply by selecting the “Restore Default” button provided on the form:

A screenshot of a form with a yellow background. It contains two input fields: 'Current Value = 0.27' and 'Updated Value ='. Below these fields are two buttons: 'Apply' and 'Restore Default'. The 'Restore Default' button is circled in red.

Now that the fitting K values have been modified, the user can add the specialty fittings that are not currently in the fitting database. In examining the form, there is an “Add Fitting” button underneath the element drop down list:

A screenshot of the 'Project Options' dialog box, 'Element Options' tab. The 'Element Type' is set to 'Pipe'. Below it are 'Add Fitting' and 'Delete Fitting' buttons. The 'Element Properties' section shows a table of pipe fittings and their K values.

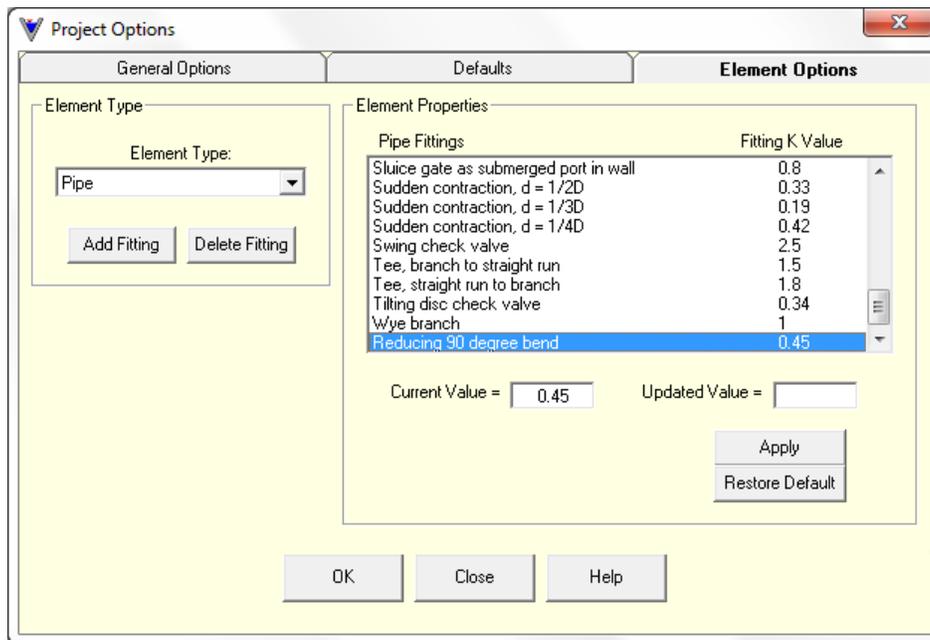
Pipe Fittings	Fitting K Value
11.25 degree elbow or bend	0.13
22.5 degree elbow or bend	0.15
30 degree vertical bend	0.1
45 degree elbow or bend	0.2
90 degree box turn	1
90 degree elbow, long radius	0.2
90 degree elbow, standard	0.27
Angle valve	2.5
Bellmouth outlet	0.9
Butterfly valve	0.3

Below the table are 'Current Value = 0.27' and 'Updated Value =' fields.

When the “Add Fitting” option is selected, the following form is displayed:

A screenshot of the 'Add new fitting' dialog box. It contains a text area for 'Add new fitting to database' with the text 'Add new fitting and K value:'. Below this are two input fields: 'Fitting description:' with the text 'Reducing 90 degree bend' and 'Fitting K value = 0.45'. At the bottom are 'Add Fitting' and 'Cancel' buttons.

This form allows the user to provide a fitting description and associated K value. When the description and K value have been provided, the database can be updated to include the new fitting:



The same operation can be done for the other specialty fitting so that is added to the database. Once this is done, the K values have been updated and the specialty fittings have been added to the database, and the software is ready to be use!