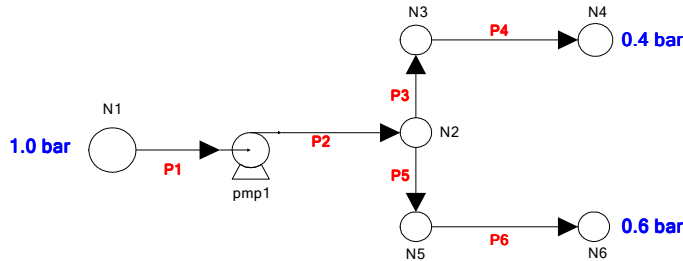


This short guide will show you how to begin to use VisualFlonet to calculate pressure drops and flow rates for liquids or gases in piping networks.

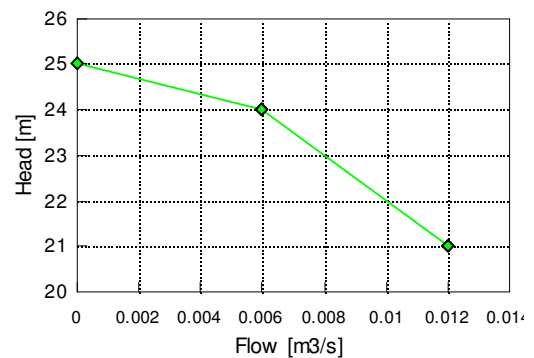
Within seconds from now you will have learned how to use VisualFlonet to calculate the pressures and flowrates in the network given the inlet and exit pressures below: -



PIPE DATA

Pipe	Length (m)	Bore	Fittings	Temp °C
P1	50	2"	4 x 90° Bends (radius 500mm)	40
P2	50	2"	1 x T-Junction Type 2	40
P3	50	1"	1 x 1" Globe Valve - cast	40
P4	30	1.5"	7 x 90° Bends (radius 300mm)	30
P5	50	1"	1 x 1" Globe Valve - forged	40
P6	30	1.5"	2 x T-Junction Type 3	30

PUMP CURVE



All pipes are Schedule 40, mild steel and slightly corroded.

Okay start VisualFlonet.

- Click on **Start | Programs | PEL | VisualFlonet**. Click **Enable Macros** twice and the VisualFlonet splash screen appears briefly.

*The first thing to do is to specify we want to do a **Flow Calculation** from the pressures that we have been given.*

- Click on **VisualFlonet Options** on the VisualFlonet toolbar. On the **Project** tab in the **Calculation Mode** panel, click on **Flow**.

Whilst the VisualFlonet Options is open, let's check that automatic naming of nodes, pipes and pumps is switched on, and auto-connect is the default.

- Select the **Application** tab. Make sure that **Prompt for Object Name on Drop** is unchecked, and **Switch on auto-connect by default** is checked. Then click **OK**.

Now we are ready to draw the network.

- Make sure the Visio Connector tool on the Visio toolbar is selected.
- Referring to the above diagram, drag & drop node N1, pump pmp1, and nodes N2, N3 and N4. VisualFlonet connects the items and automatically names them. Before adding node N5, click on node N2 to make sure node N5 is connected to N2 and not N4. Complete the drawing by adding N6.

That was easy wasn't it? Next we need to enter the process data. Let's begin by adding the inlet and outlet pressures using the Node Conditions Editor

- Click the Edit Nodes button on the VisualFlonet toolbar to display the Edit Nodes window. Enter the pressures as defined in the above diagram: 1 bar at N1, 0.4 bar at N4, and 0.6 bar at N6. In the Height column, type 5 for the height above the datum point for each of the nodes N3, N4, N5 and N6. Save your input by clicking OK.



The Edit Pipes Editor window is used to specify the pipe data. VisualFlonet fills in the connections automatically. You can rename the pipes but you can't add or delete them. Let's start by adding the data for the first pipe and find out about the various tools for helping us. There are calculators for Pipe Inner Diameters, Pipe Roughness, and K-Values.



7. (1) Click the **Edit Pipes** button on the VisualFlonet toolbar to display the Edit Pipes window.
 (2) Click in the Length cell for P1 and enter **50**.
 (3) Click in the Inner Diameter cell for P1 then click the **RIGHT** mouse button. Select **Pipe Inner Diameter Calculator** from the pop-up menu.
 When the calculator appears select a **2" Schedule 40** pipe and click **OK**. VisualFlonet will paste the result back into the cell.
 (4) Click in the Roughness cell and again click the **RIGHT** mouse button and select **Roughness Calculator**. Select **Mild Steel (slightly corroded)**, click **OK** and VisualFlonet will again paste the result back into the cell.
 (5) Click on the **Fittings Loss Coefficient** cell and again click **RIGHT** mouse button and select **K-Value Calculator**. When the calculator appears, click on the **Bends** tab, type **500** in the radius box and **4** in the Quantity box and click **Add**. Click on the **Summary** tab to display the K-Value summary and then click **OK**. VisualFlonet will again paste the result back into the cell.
 (6) Click on the Temperature cell and type in **40**.

That's the first pipe done. Now add the data for the other five pipes using the information in the above table. Try using the special Cut & Paste from the popup menu to paste the Roughness into all the pipe roughness cells. Remember to double-click on the valves in the K-Value Calculator to display the required options. Why not try adding the data for one of the pipes by double-clicking on the pipe in the drawing; you will still have access to all the calculators.

We've entered a lot of data now so it's a good idea to save the drawing at this stage.



8. Click on the Save button on the toolbar and save the data in **VisualFlonet.VSD** on the **C:** drive

*Next we need to enter the Pump characteristics. We could use the **Pump Editor** on the VisualFlonet toolbar but there is only one pump so we will use the editor for a single pump.*

9. Double-click on the pump **mpm1** in the drawing to display the **Edit Pump** window. Select the **Characteristic Pump Curve** tab and set the Number of points to **3**. Using the graph above, type in the following three pairs of values for Head and Flow: -
25.0, 0.0 24.0, 0.006 21.0, 0.012

*Finally, we need to add the physical properties. To do this we need the **Physical Properties Editor** window.*



10. Click on the **Physical Properties** button on the VisualFlonet toolbar to display the Physical Properties window. Select **Liquid** as the Fluid Type then enter the following 3 pairs of temperatures and pressures: **0.1bar & 10°C, 1bar & 20°C, 2bar & 40°C**. Next click **Calculate** in the top right-hand corner to calculate liquid density and viscosity.

The Physical Property Calculator appears

11. First select the components. (If some are already present, click on **Clear Worksheet** to remove them.) Click on **Add Component** and type **W** in the **Search For Name** box. Four components are found beginning with the letter W. Click on **Water** and then click on **Add to Stream**. Next, delete **W** from the Search box and type in **ET** for Ethanol. Select **Ethanol** from the results and click on **Add to Stream** then **Close**.

The last thing we need to do for the physical properties is to specify the composition. You can use the spreadsheet to specify the stream composition, both in terms of moles or mass, and as quantities or fractions.

12. Click on the **Mass Fraction** cell for Water to give it "focus". Enter **0.5** for **both** Ethanol and Water. The Physical Property Calculator updates the spreadsheet. If you wish, the Calculator will also normalise the values if they do not add up to 1.

All that's all the input we need to calculate the physical property data so ...

13. Click **Calculate** to calculate the liquid densities and viscosities at each of the 3 sets of pressure and temperature. Click **OK** to close the Physical property calculator and automatically transfer the results back to the Physical Properties Editor. Finally, click **OK** to close the Physical Properties window

That's it for the input data for VisualFlonet. Now we're ready to run the calculation.



14. Click the **Calculate** button on the VisualFlonet toolbar. The hourglass appears until the calculations are complete when the hourglass disappears and the results appear in the Results window.

You will see that the calculated flowrates are 2.55 kg/s at the inlet, and 1.33 kg/s and 1.22 kg/s at the outlets N4 and N6 respectively.

And that's it! If you still have some time, try doing a Pressure calculation by specifying the inlet and outlet flows

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