Works 2013

Pressure flow

WHITEPAPER

TECHNO logismiki
Advanced Technical Software

5 Imitou str, 15561, Cholargos, Athens, Greece
tel: ++30 210 65 64 147 - fax: ++30 210 65 48 461
www.technologismiki.com - info@technologismiki.com

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Chapter

1 About the whitepaper

1.1 Purpose

The purpose of this example is to calculate the flow rate of a circular section under pressure. The section has the following properties:

Property	Value
Pipe length	200 m
Diameter	0.350
Pipe slope	0
Pressure difference	20 atm
Fluid	Water 20°C
Friction coefficient	0.02

For turbulent flow (Re>4000) the Swamme – Jain formula will be used, for laminar flow (Re < 2000) the Reynolds number will be set equal to 64/Re, while for transitional flow the program will perform an interpolation using the Moody diagram.

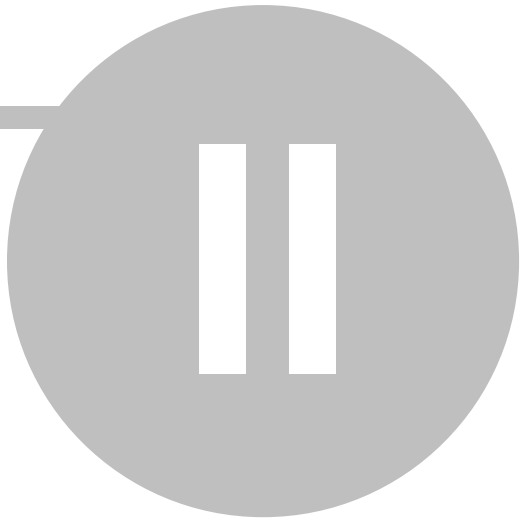
1.2 Software

In order to complete the example successfully, the following software is required:

- Hydraulic Solver v11.0.

Later versions of the aforementioned software may be incompatible with the structure of the example as it is presented herein.

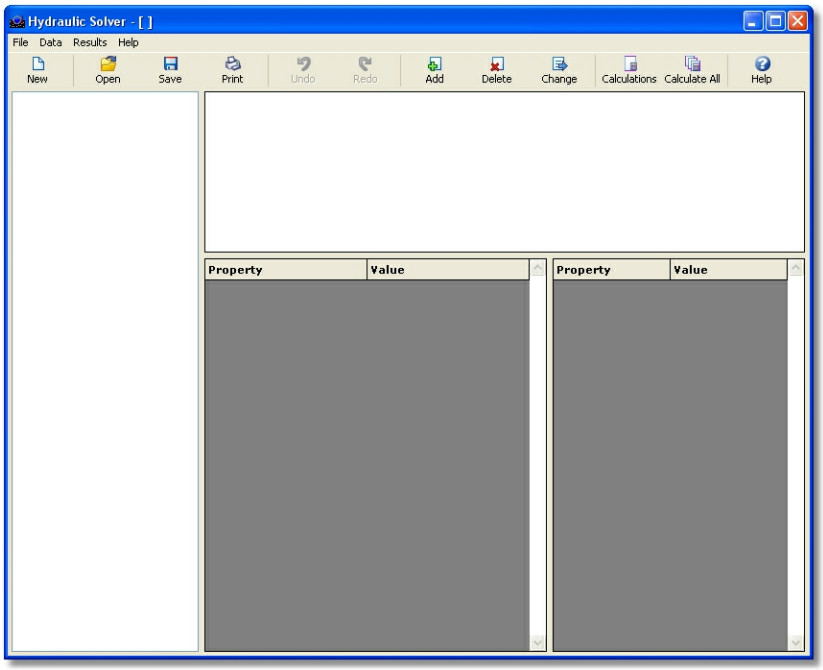
Chapter



2 Steps

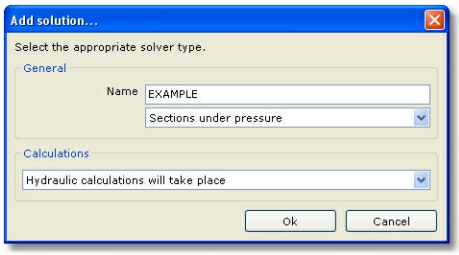
2.1 Step 01: New Project

Select **New Project** from the **File** menu. The program will remove any data from memory and prepare to start a new project:



2.2 Step 02: Add Solution

Select **Add Solution** from the **Data** menu. The following form appears:



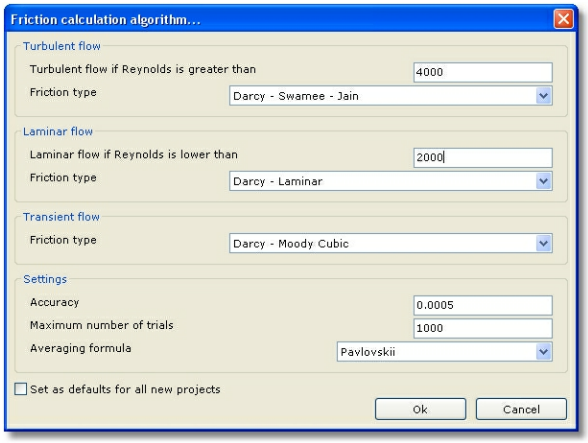
Enter the following data:

- **Name:** Enter "EXAMPLE".
- Select **Sections under pressure** from the drop-down list.
- Select **Hydraulic calculations will take place** from the drop down list.

Select **Ok.**

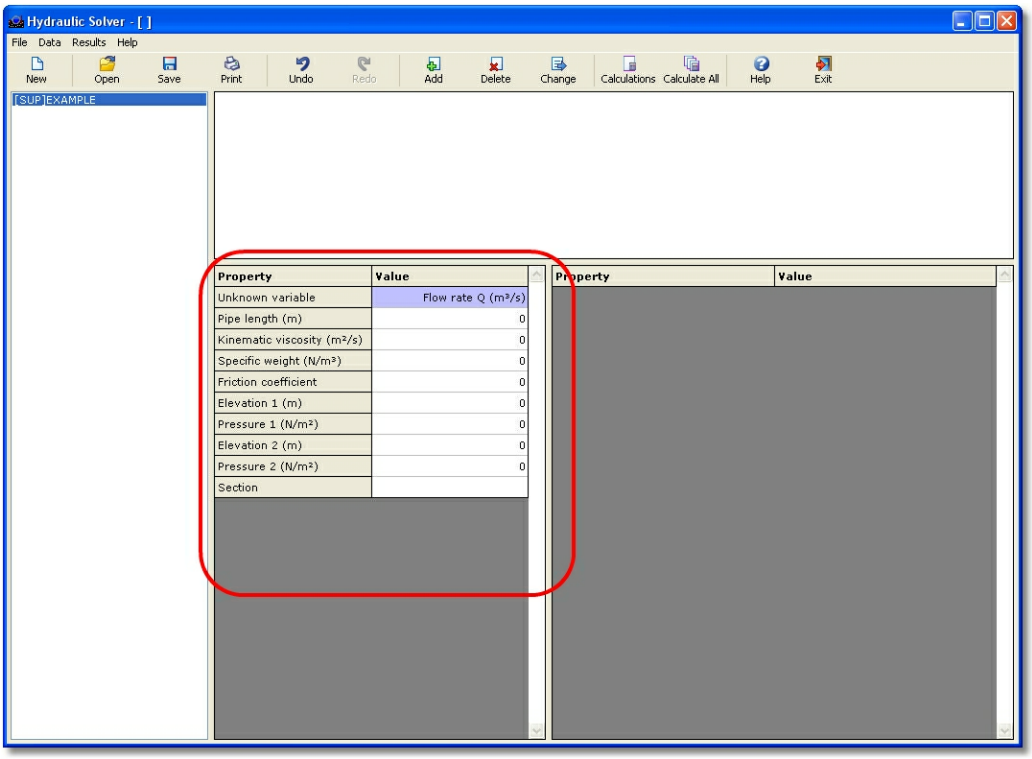
2.3 Step 03: Data input

Select **Friction Calculation** from the **Data** menu:



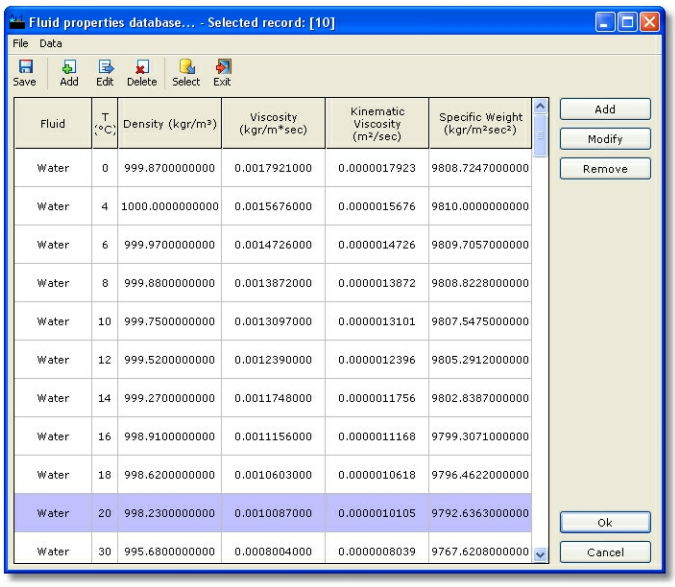
Enter the following data:
In **Turbulent flow** type "**4000**" in the **Turbulent flow if Reynolds is greater than** field and select **Darcy - Swamee - Jain** as the **Friction type**.
In **Laminar flow** type "**4000**" in the **Laminar flow if Reynolds is lower than** field and select **Darcy - Laminar** as the **Friction type**.
In **Transient flow** select **Darcy - Moody Cubic** as the **Friction type** and press **Ok**.

Enter the rest of the data by typing directly into the left grid of the main form:

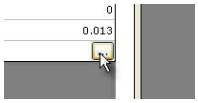


Enter the following data:

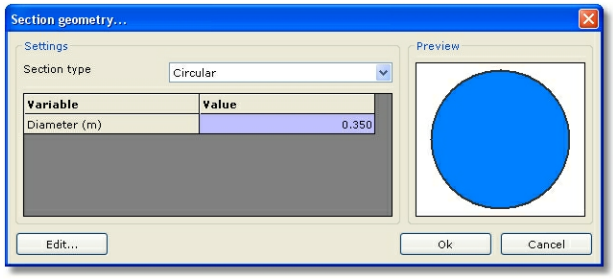
- **Unknown variable:** Select **Flow rate Q (m^3/s)**.
- **Pipe length**: type "200" and hit ENTER. Note that the unit conversion button is displayed, with which you can enter the pipe length in another unit system.
- **Kinematic viscosity**: Click on the cell, select the button with the ellipses (...) to invoke the corresponding database, select water 20°C and press Ok:



- **Specific weight**: Click on the cell, select the button with the ellipses (...) to invoke the corresponding database, select water 20°C and press Ok.
- **Friction coefficient**: type "0.02" and hit ENTER.
- **Elevation 1**: The pipe slope is zero therefore you can ignore this field
- **Pressure 1**: The program expects all values to be in N/m^2 so click on the cell and the click on the **U** button that shows up to invoke the **Unit conversion** routine. In **Unit conversion** select **Atmospheres** as the unit, type "**20**" in the next field and click **Ok**.
- **Elevation 1**: The pipe slope is zero therefore you can ignore this field
- **Pressure 1**: Type "**0**" and press ENTER.
- **Section**: A button with ellipses (...) appears when you double-click into the cell:



Select this button to invoke the section type form:



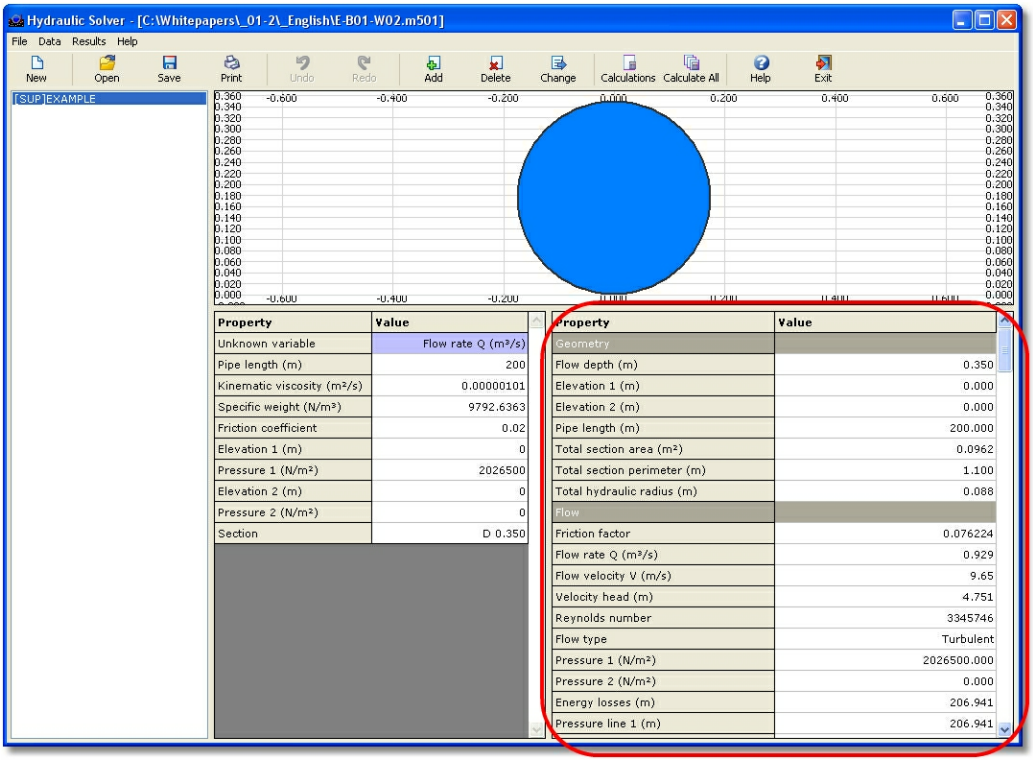
Enter the following data:

- **Section type**: Select **Circular** from the drop-down list.
- **Width (m)**: type "0.350" and hit ENTER.

The program will display a preview of the section when it is 100% full. Select **Ok.**

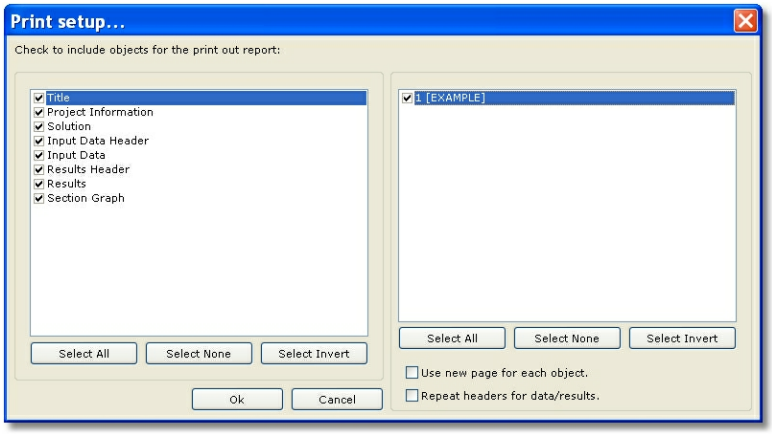
2.4 Step 04: Calculations

The calculations are performed automatically. The results are displayed in the right grid of the main form:



2.5 Step 05: Printing

Optionally, you may want to print the results to a printer, to Microsoft Word or Microsoft Excel. From the **File** menu select **Print setup:**



Select the solution "EXAMPLE" from the list on the right and select **Ok**.

From the **File** menu select **Print** or **Print To > Word** or **Print To > Excel** to invoke the corresponding print engine.

Chapter

3 Help

3.1 Technical support

Technical Support

TechnoLogismiki offers technical support 24 hours per day, 365 days per year, through the Web site where you can get information on the latest programs and services.

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Please use the dedicated e-mail addresses for better customer service:

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- for questions regarding the usage of programs: support@technologismiki.com
- for any other question or comment: info@technologismiki.com

The normal response time is within two business days. If your inquiry cannot be answered via e-mail, a customer service representative will contact you via telephone.

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- Telephone [3 lines]: ++30-210-656-4147
- FAX: ++30-210-654-8461
- Address: 5, Imitou str, Cholargos, 15561, Athens, Greece.