EleaKTRA Field Studio

EleaKTRA Field Studio

...a world of solutions

www.syntechsys.com

Syntechsys™
GLOBAL NETWORK

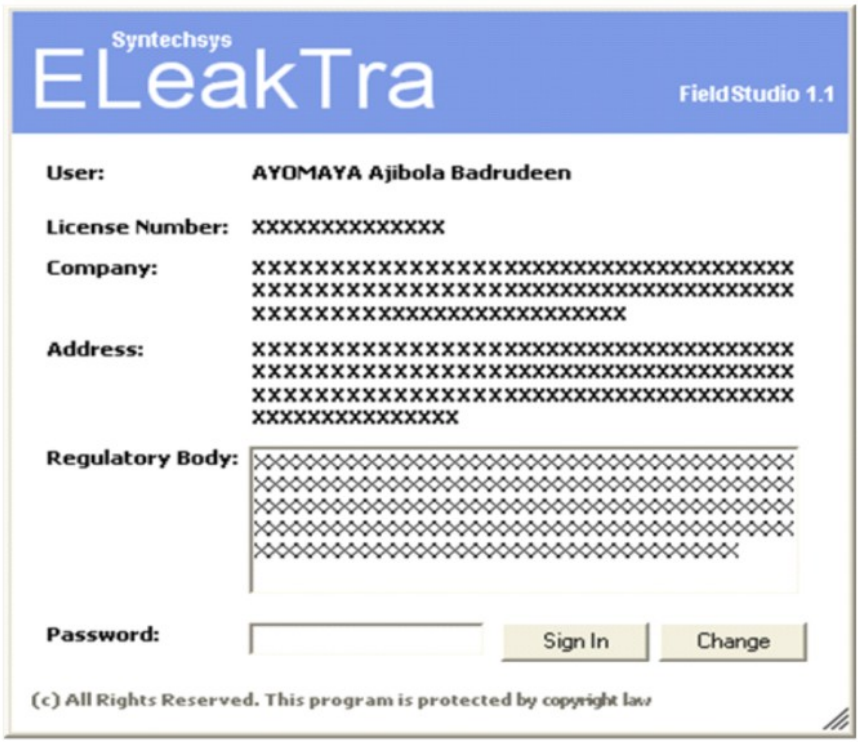
INTRODUCTION

ELeakTra FieldStudio is developed for use in real life situations to predict leak occurrences in pipes and other media.
This report documents the operation of ELeakTra FieldStudio.

SPLASH SCREEN

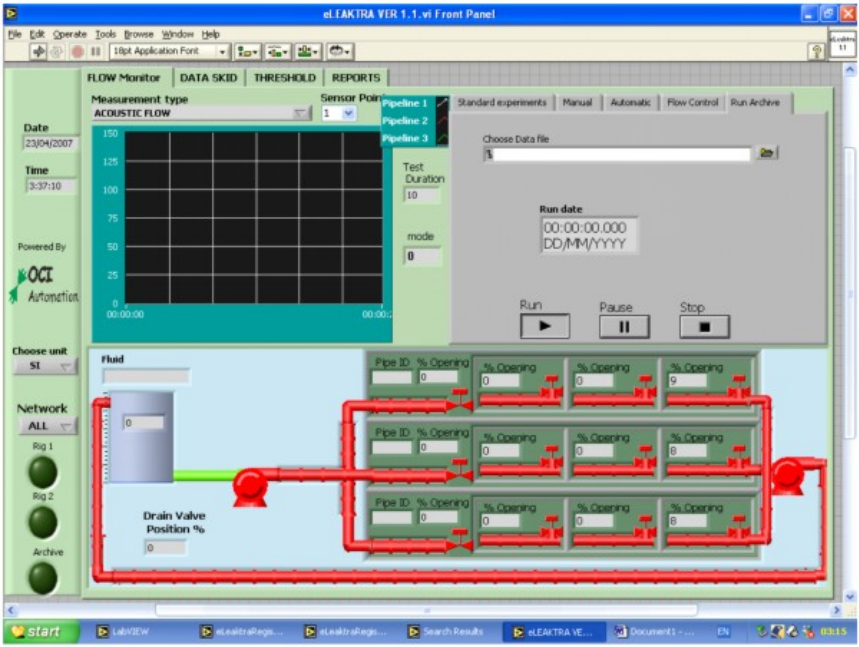
Upon Launching ELeakTra FieldStudio, a splash screen is displayed containing information about the current registered user, including the user's name, license number, company, address and regulatory body. The user is required to enter a password before being granted access to the system.

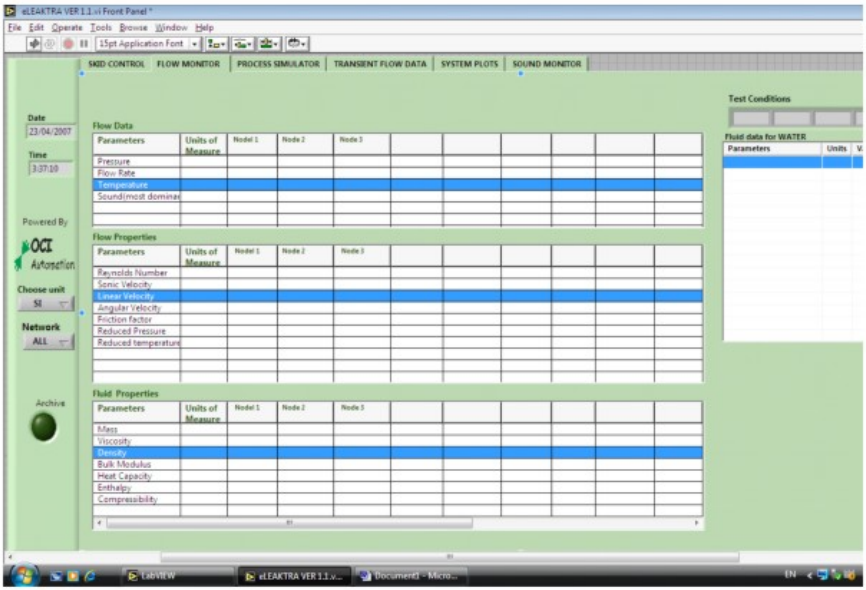
The user also has the option of changing the current password. Figure 1 below shows a screen shot of the splash screen.



SYNTECHSYS USA
Head Office
420, Jerico Turnpike Suite #324
Jerico New York 11753
Tel: (516) 934-0951
Fax: (516)934-0952

SYNTECHSYS NIGERIA
2 Kanike Close, Off Awolowo Rd
Ikoyi,South West, Lagos, Nigeria
Tel No : 234-833416316, 01-8732090
E-mail: Info@Syntechsys.com
www.syntechsys.com


eLEAKTRA VER 1.1.vi Front Panel
File Edit Operate Tools Browse Window Help
FLOW Monitor
DATA SKID
THRESHOLD
REPORTS
Measurement type
ACOUSTIC FLOW
Sensor Point
Pipeline 1
Pipeline 2
Pipeline 3
Standard experiments
Manual
Automatic
Flow Control
Run Archive
Choose Data file
Test Duration
mode
Run date
00:00:00.000
DD/MM/YYYY
Run
Pause
Stop
Date
23/04/2007
Time
3:37:10
Powered By
OCI Automation
Choose unit
SI
Network
ALL
Rig 1
Rig 2
Archive
Fluid
Drain Valve Position %
Pipe ID
% Opening
start


eLEAKTRA VER 1.1.vi Front Panel *
File Edit Operate Tools Browse Window Help
SKID CONTROL
FLOW MONITOR
PROCESS SIMULATOR
TRANSIENT FLOW DATA
SYSTEM PLOTS
SOUND MONITOR
Test Conditions
Fluid data for WATER
Flow Data
Parameters
Units of Measure
Node 1
Node 2
Node 3
Pressure
Flow Rate
Temperature
Sound(most dominat
Flow Properties
Reynolds Number
Sonic Velocity
Linear Velocity
Angular Velocity
Friction factor
Reduced Pressure
Reduced temperature
Fluid Properties
Mass
Viscosity
Density
Bulk Modulus
Heat Capacity
Enthalpy
Compressibility
Date
23/04/2007
Time
3:37:10
Powered By
OCI Automation
Choose unit
SI
Network
ALL
Archive

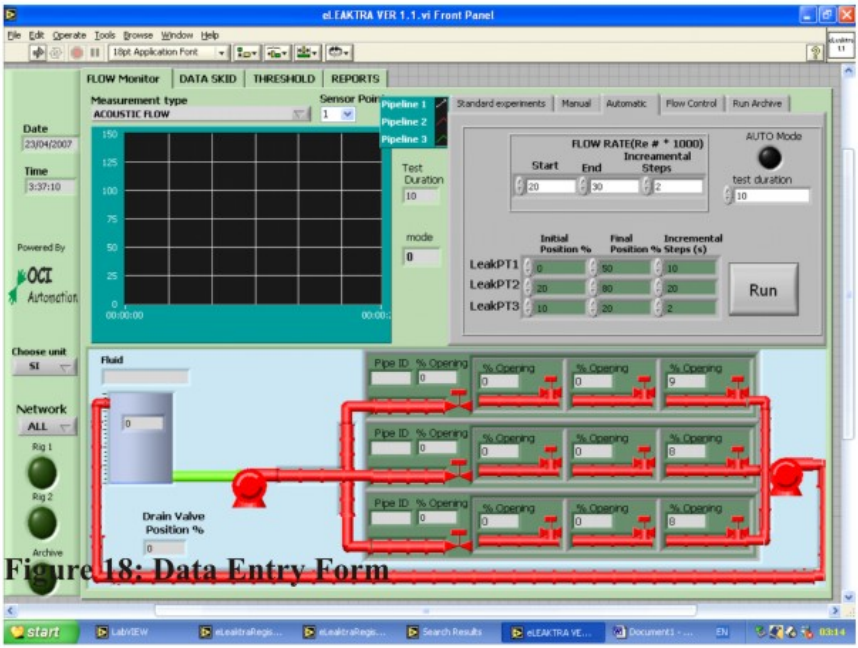
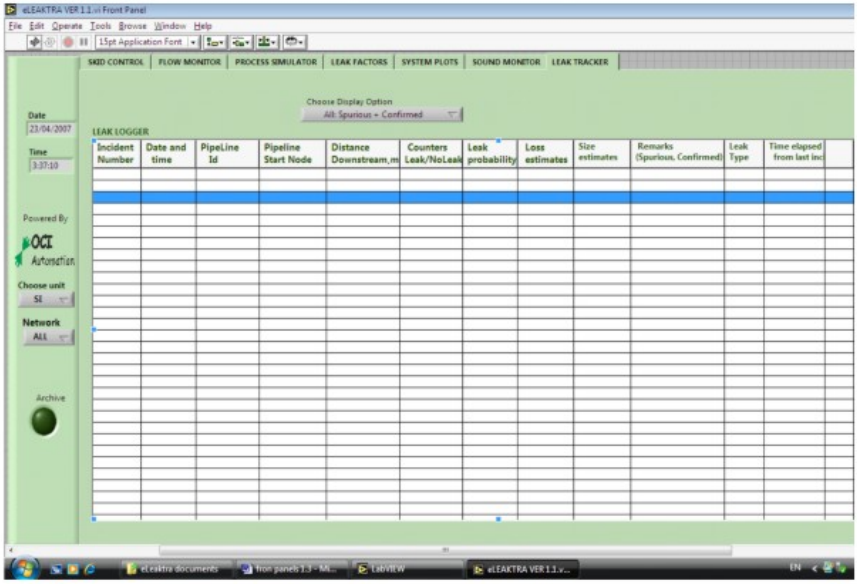
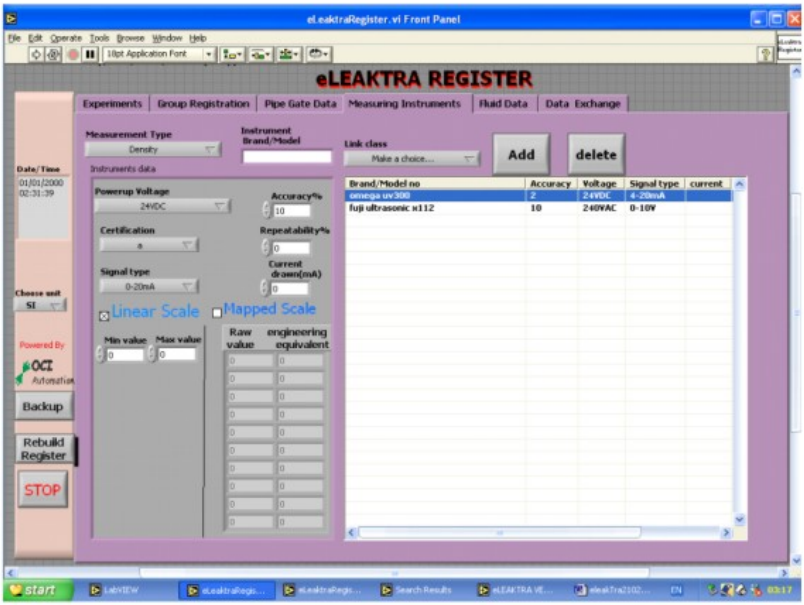
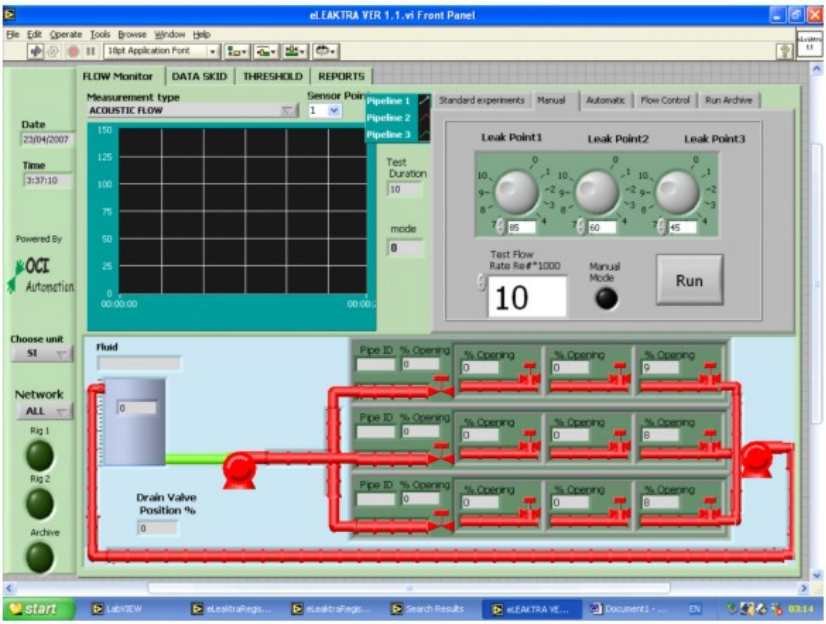


Figure 18: Data Entry Form




eLeaktraRegister.vi Front Panel
eLEAKTRA REGISTER
Experiments
Group Registration
Pipe Gate Data
Measuring Instruments
Fluid Data
Data Exchange
Measurement Type
Density
Instrument Brand/Model
Link class
Make a choice...
Add
delete
Instruments data
Brand/Model no
Accuracy
Voltage
Signal type
current
omega uv300
2
24VDC
4-20mA
fuji ultrasonic x112
10
240VAC
0-10V
Powerup Voltage
24VDC
Accuracy%
Certification
Repeatability%
Signal type
0-20mA
Current drawn(mA)
Linear Scale
Mapped Scale
Min value
Max value
Raw value
engineering equivalent
Date/Time
Choose unit
SI
Powered By
Backup
Rebuild Register
STOP


eLEAKTRA VER 1.1.vi Front Panel
FLOW Monitor
DATA SKID
THRESHOLD
REPORTS
Measurement type
ACOUSTIC FLOW
Sensor Port
Pipeline 1
Pipeline 2
Pipeline 3
Standard experiments
Manual
Automatic
Flow Control
Run Archive
Date
23/04/2007
Time
3:37:10
Test Duration
mode
Leak Point1
Leak Point2
Leak Point3
Test Flow Rate Re#*1000
Manual Mode
Run
Powered By
Choose unit
SI
Network
ALL
Rig 1
Rig 2
Archive
Fluid
Pipe ID
% Opening
Drain Valve Position %

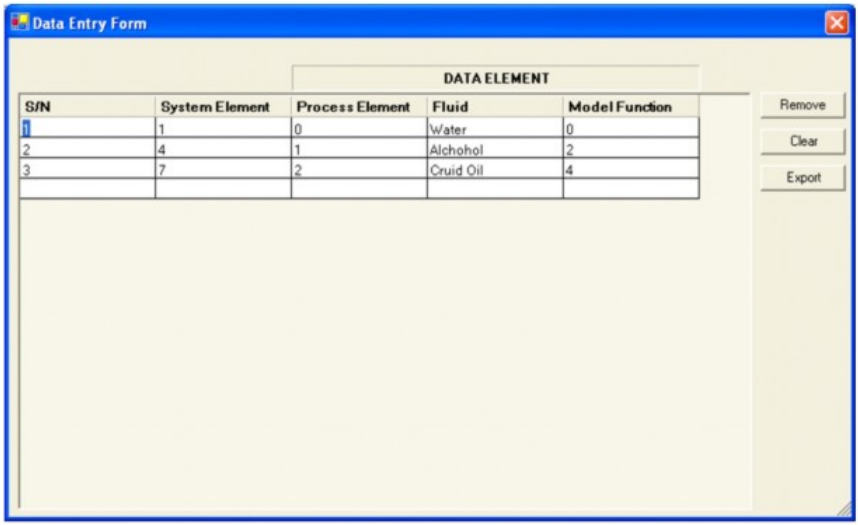
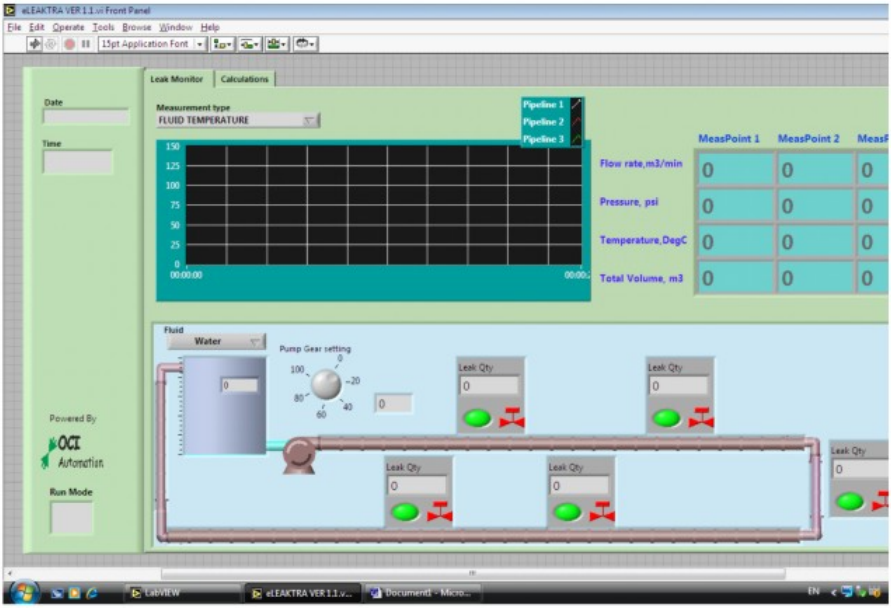


Figure 18: Data Entry Form



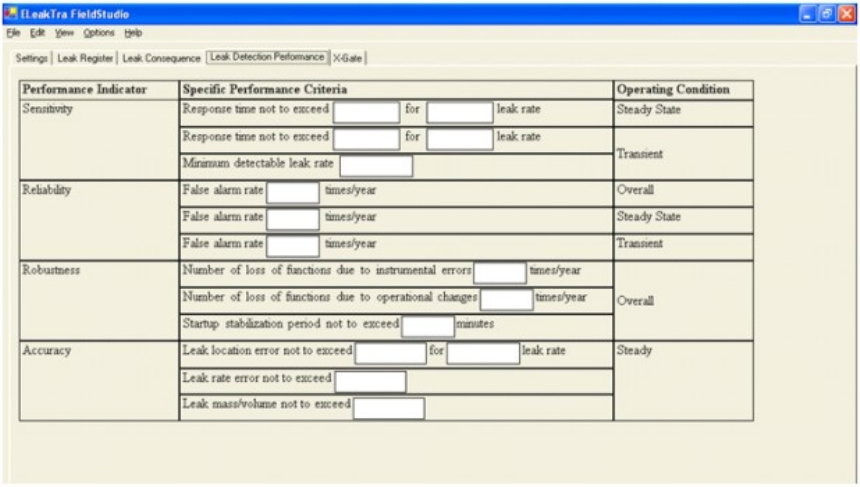


Figure 16: Leak Detection Performance

X-GATE

The final tab is the X-Gate tab. It comprises of several tabs each receiving data about the system, process, model and fluid. Figure 17 below depicts the tab.

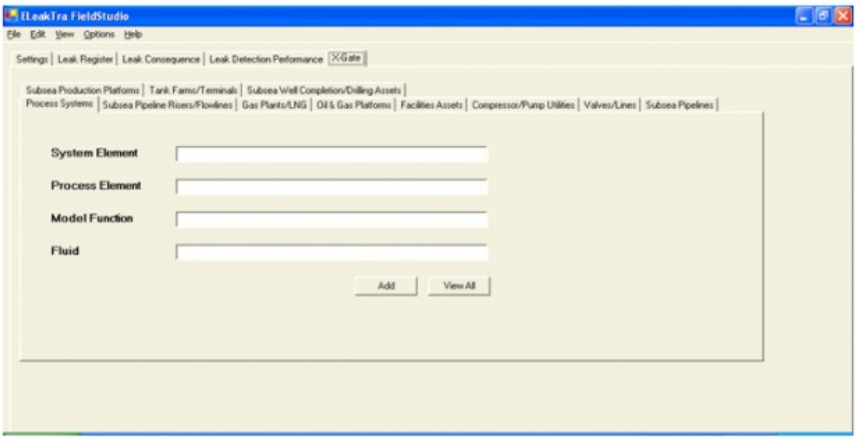


Figure 17: Leak Detection Performance

To add values, the form is filled and the 'Add' button is then clicked. To view all values added, click on the View All button. The dialog box below is displayed.

LEAK CONSEQUENCE

In the Leak Consequence tab, information is collected about the consequences of the recorded leak. Other values could be calculated using this information. The figure below depicts the Leak Consequence tab.

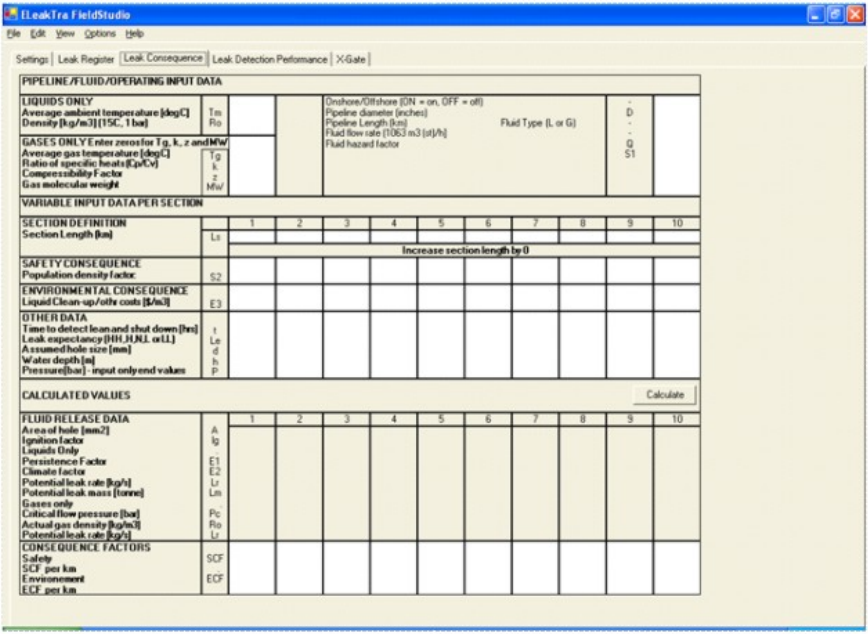


Figure 15: Leak Consequence

LEAK DETECTION PERFORMANCE

The Leak Detection Performance tab collects information about the performance of current leak detection methods. The figure below shows the Leak Detection Performance tab.

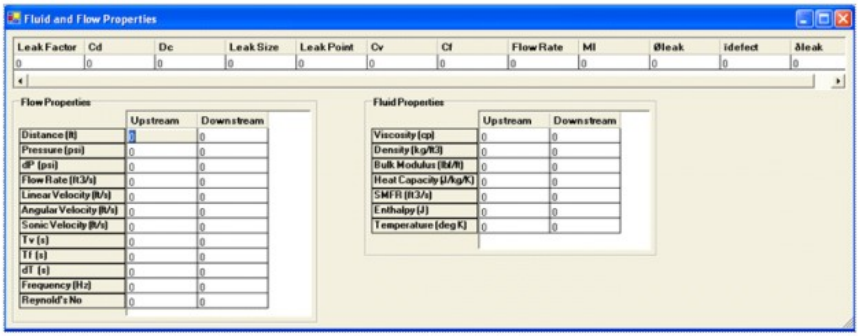


Figure 13: Fluid and Flow Properties

Multiphase Flow

The Multiphase Flow view displays information about the properties specific to a multiphase fluid, as shown in Figure 14 below.

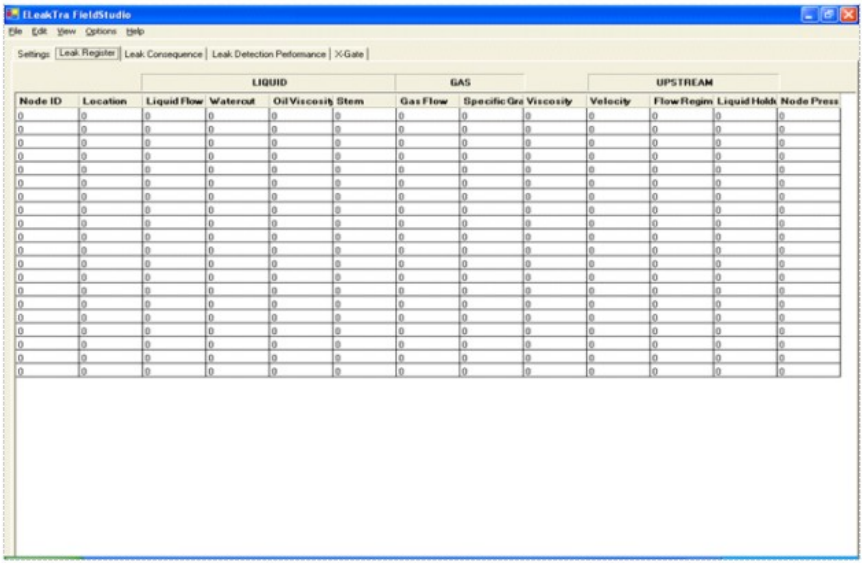


Figure 14: Multiphase Flow

Flow Simulator

The Flow Simulator window displays information about the flow properties associated with each node in the pipe. These properties include the Pressure, Pressure Point Analysis, Flow Rate, Linear Velocity, Angular Velocity, Sonic Velocity, Change in Time, Frequency, Reynold's Number, Viscosity, Heat Capacity, Bulk Modulus, Superficial Mass Flow Rate, Temperature and Enthalpy.
Figure 12 below shows the Flow Simulator

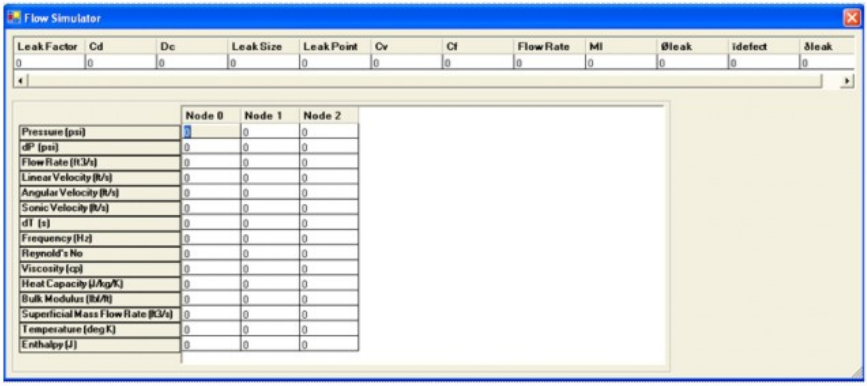


Figure 12: Flow Simulator

Flow and Fluid Properties

The Fluid and Flow Properties window displays information about the general flow properties upstream and downstream of the point on the pipe where there is a leak as well as the properties of the fluid flowing in the pipe. The flow properties shown are the distance where the leak occurs, the pressure, pressure point analysis, flow rate, linear velocity, angular velocity, sonic velocity, time, change in time, frequency and Reynold's number.
The fluid properties shown are the viscosity, density, bulk modulus, heat capacity, superficial mass flow rate, enthalpy and temperature.
Figure 13 below depicts the Fluid and Flow Properties View.

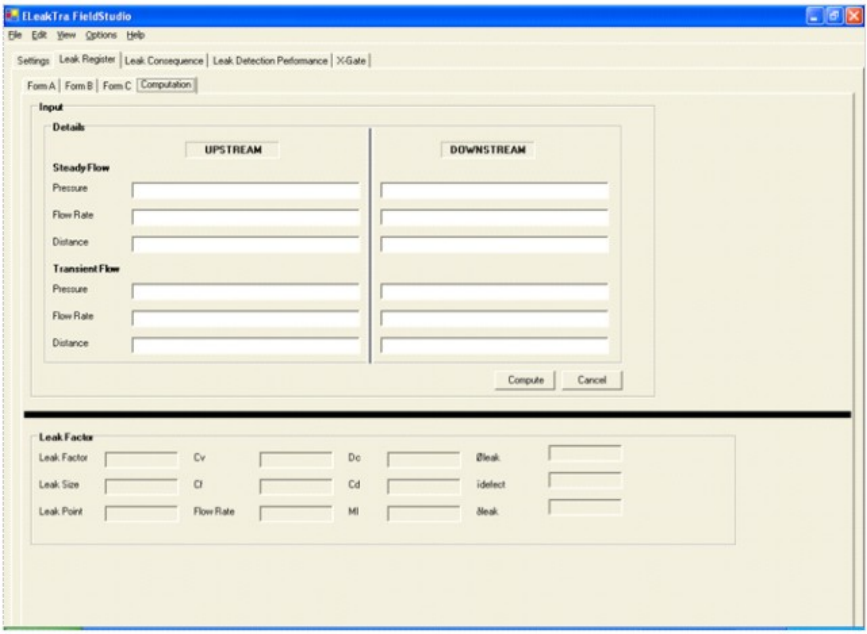


Figure 10: Computation

Further details about the calculated leak factor can be seen under the View Menu. These are:

a) Flow Simulator
b) Fluid and Flow Properties
c) Multiphase Flow

Figure 11: Computation

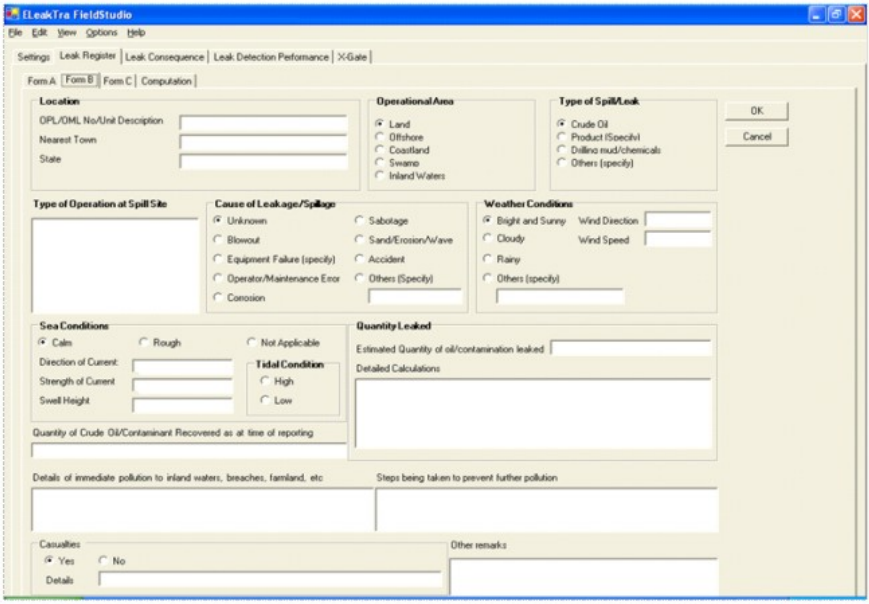


Figure 8: Form B

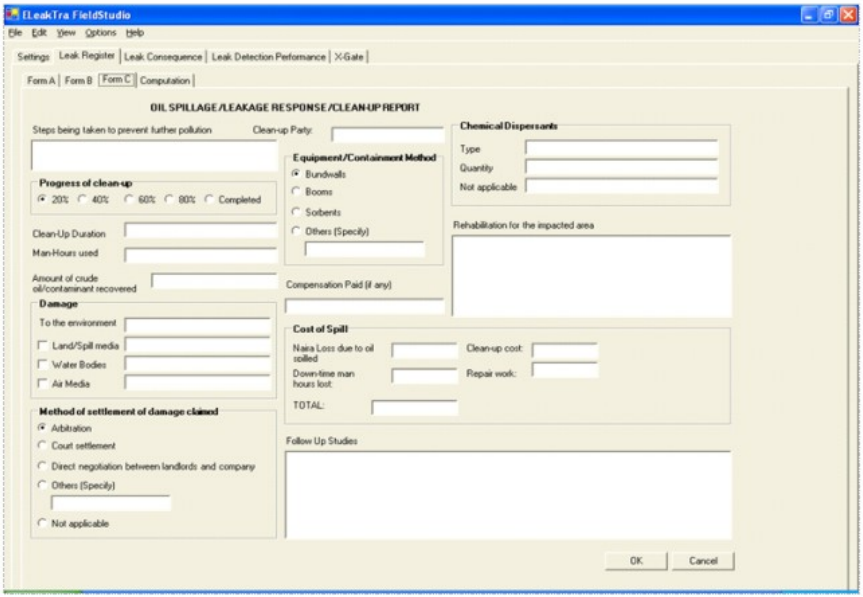


Figure 9: Form C

LEAK REGISTER TAB

After the operating parameters have been set, the system is ready to begin computations. The Leak Register Tab consists of four sections viz; Form A, Form B, Form C and the Computation tab. The forms collect detailed information about the leak, while the computation tab calculates the leak factor corresponding to such recorded leaks.

The figures below represent screen shots of these sections.

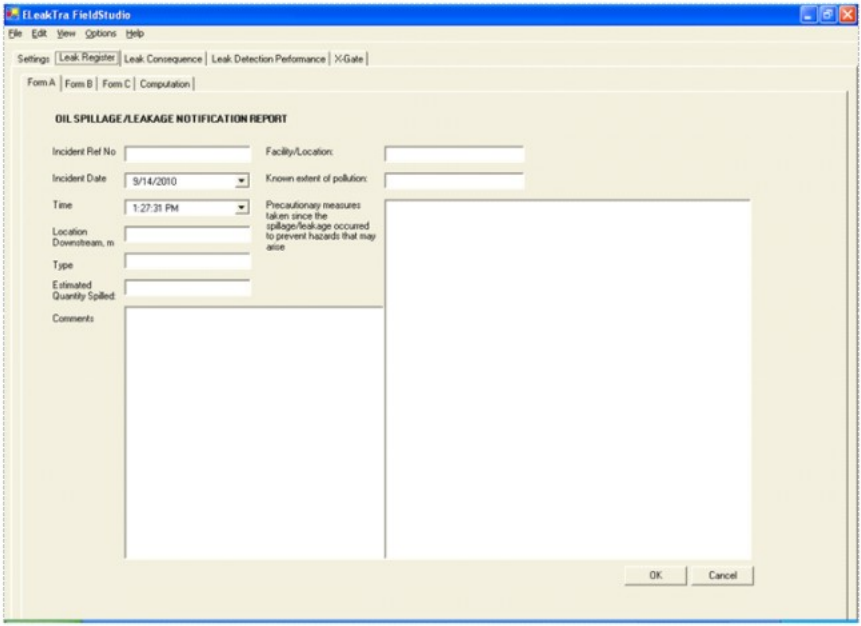


Figure 7: Form A

Process Instrumentation

The Fluid Skid

On the fluid skid, settings are made for properties specific to the fluid under observation. These properties include the the liquid fluid properties for liquids, the gas fluid for gases and the liquid fraction. The liquid fluid properties include the fluid type, the viscosity, heat capacity, bulk modulus, density, critical pressure, critical temperature, watercut and molar mass.

The gas fluid properties include the fluid type, the viscosity at reference temperature, the reference temperature, the Sutherland's constant, the critical pressure, the critical temperature, the number of modes, the gas compressibility constants, the heat capacity constants and the gas oil ratio.

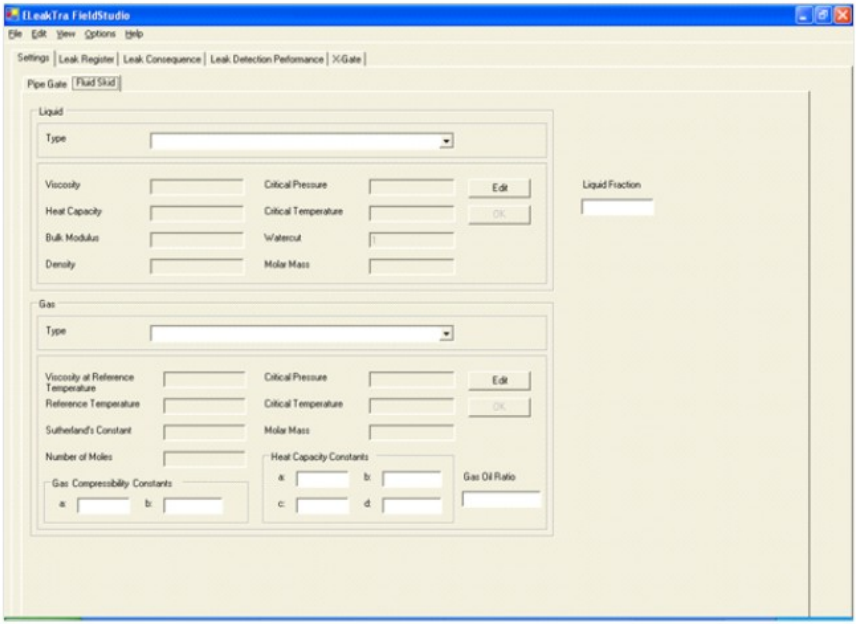


Figure 6: Fluid Skid

To view all fittings currently on the pipe, click on the View All button. A dialog box similar to the one in Figure 6 below is displayed

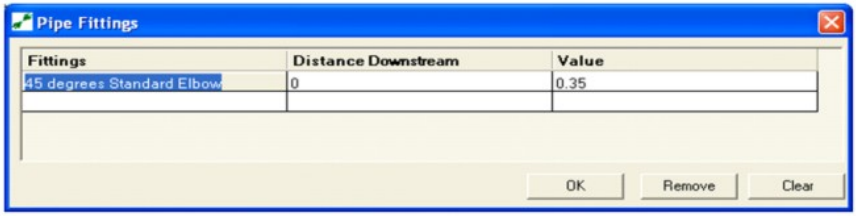


Figure 4: Pipe Fittings Dialog

To remove a fitting, select the fitting and click on the Remove Button. To remove all fittings, click on the Clear Button. Click on the OK Button to close the dialog box.

Process Control

Process controllers are any features or settings that may influence the flow rate of the fluid through the pipe. These include the Pump Discharge Pressure, the Pump Suction Pressure, and Valves.

As with pipe fittings, to specify the placement of the valve on the pipe, the actual valve type is selected from the valve drop down list, and then the distance downstream to where it is positioned is entered in the Distance Downstream text box. The Add button is clicked on to register the settings, while the View All button is clicked on to display all valves currently attached to the pipe.

Figure 5: Process Control Skid

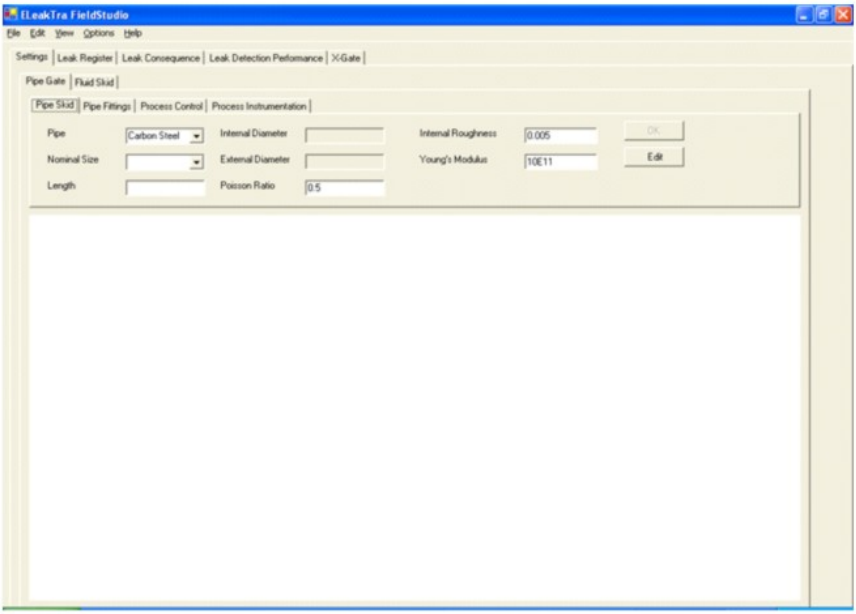


Figure 2: The Pipe Skid

Pipe Fittings

Pipe Fittings refer to any component attached to the pipe at a certain distance downstream that may affect the steady flow of the fluid. The skid is as shown below.

Figure 3: Pipe Fittings Skid

To specify the placement of pipe fittings on the pipe, select the actual fitting from the Fitting drop down list, and then enter the distance downstream to where it is positioned in the Distance Downstream text box. Click on the Add button to register the settings.

Figure 1: Splash Screen

Once the user enters the correct password and clicks on the 'Sign In' button, the system user interface is displayed.

The user interface consists of five general tabs: the Settings tab, the Leak Register tab, the Leak Consequence tab, the Leak Detection Performance tab and the X-Gate tab.
These tabs shall be discussed below in detail.

SETTINGS TAB

In the Settings Tab, general conditions of the simulated operating environment are set. This environment includes: the Pipe Gate, and the Fluid Skid.

Pipe Gate

The Pipe Gate holds general operating conditions related to the pipe through which the fluid would flow. These conditions are set in 4 different tabs: the Pipe Skid, the Pipe Fittings tab, the Process Control tab and the Process Instrumentation tab.
Also, a large canvas area is displayed on the Pipe Gate. Based on the pipe settings, a graphical representation of the pipe is displayed on the canvas.

Pipe Skid

On the Pipe Skid, settings are made for the pipe specifics, including the type of the pipe (the default is Carbon Steel), the nominal size, the pipe length, the pipe internal diameter, the pipe external diameter, the pipe poisson ratio, the pipe internal roughness and the young's modulus.
Figure 2 below displays the Pipe Gate, with the Pipe Skid being the active tab.