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2 TUTORIAL

2.1 Getting Started

To create a TRIFLEX Windows Icon on your desktop, do the following:

1. Click on the START button in the lower left corner of your screen.
2. Highlight Find and click on Files or Folders.
3. Enter TriflexWindows.exe in the Named field; select all hard drives in the Look in field and click on Find Now. The default path is:

   C:\Program Files\PipingSolutions\TriflexWindows

4. Right click on the TriflexWindows.exe file name
5. Highlight Create Shortcut and left click
6. Click YES to respond to the Windows Message to place the TRIFLEX Windows Icon on the desktop.

To execute TRIFLEX Windows, double click on the TRIFLEX Windows Icon on the desktop.

To open an Existing Piping Model, click on FILE and from the pop-up menu, select OPEN. From the path (c:\ProgramsFiles\PipingSolutions\TriflexWindows\Samples\Tutorial01), open Tutorial01.DTA file.
2.1.1 Main Screen Layout

When TRIFLEX is first brought up, the TRIFLEX introduction screen as shown in Figure 2.1.1-1 appears.

The Component toolbar buttons are the same as the components listed at the bottom of the Components pop-up menu. To create a component, click on one of the component buttons or select and click on Component on the Main menu, and then highlight the component you wish and click on it.

Graphics Window

Thumb-wheels & Zoom Slider

There are three wheels on the screen. The two thumb-wheels in the lower left corner: Rotx, Roty will rotate the piping system around x-axis and y-axis respectively. There is a third thumb wheel located on the lower right corner. In
Orthogonal mode, the thumb wheel will be labeled Zoom and will allow the user to zoom in and out on the model. In Perspective mode, the third thumb-wheel will be labeled Dolly and will enable the user zoom in and out in walk-through style. In Perspective mode, a slider is also provided in the lower right corner to enable the user to zoom in and out.

Note: +y axis is always up (vertical) in a piping model in TRIFLEX.

Toolbars and Menus

On left side of the screen, two Toolbars are provided. The buttons in the left column make up the Components Toolbar. The buttons in the right column make up the Graphic Toolbar.

Along the top of the screen, two rows of the Main Menu are provided. They are similar in style to the standard Microsoft Menu Layout and provide editing facilities, file services, graphic facilities, etc.

Figure 2.1.1-2 Status Bar Indicator

Status Bar

This is located on the bottom view of the screen (Figure 2.1.1-2).

**APP** - Refers to Append Mode as opposed to INS (Insert) Mode.

**EMPTY** – Appears when a piping model has not yet been created or loaded.

When a piping model has been created or loaded, the following two items will appear:

**3B CURR** - Current Component is No. 3 and is a Branch from node 1010 to 1020.

**12 TOT** - Refers to the piping model having a total of 12 Components.

**NOSYS** - Appears when a piping model has not been created or loaded. When a piping model has been created or loaded, the following two items will appear to indicate the status of the geometry of the system:

**OK** - indicates that there is no geometry error.

**ERR** – indicates that there is a geometry error.
2.1.2 Commands for Graphical Operations

Execute the following commands to become familiar with the Graphic Toolbar. We suggest you start with the Node Labels icon and work up to the Select/View icon, Figure 2.1.2-1.

- **Select/View** – Arrow used to point at a component and select it / Hand used to move or rotate the piping model
- **View All** - Brings entire piping model into view on screen
- **Set Home** – Allows user to define a view of the piping model as the default view
- **Go Home** – Brings default view on screen
- **Toggle Axis** – Draws X, Y, Z axis - size and position can be changed
- **Zoom Point** – Brings user specified point in the piping model closer
- **Ortho/Perspective** – Right angle view or panorama view
- **Line/Render** – Line or 3D shapes – component colors can be changed
- **Node Labels** – Node number on model – font size can be changed
- **Node Locate**

Figure 2.1.2-1 Graphic Toolbar Buttons
2.1.3 Accessing Data from Piping Model

To investigate the properties of a piping model, clicking (left mouse button) on the particular component of interest. For instance, clicking on the Anchor will yield a menu such as shown in Figure 2.1.3-1. To modify any property on this component, click on **Display Component Dialog** and enter the desired data in the

![Figure 2.1.3-1 Viewing Anchor Component Properties](image)

![Figure 2.1.3-2 Worksheet](image)
component dialog from the keyboard. An in-depth discussion can be found in Section 2.3.0.

To view entered data for the piping model, including node numbers, delta dimensions, pipe sizes, restraint indicators, pipe material, insulation material, and temperature and pressure for all load cases, click on the component button icon Worksheet, located in the Main Menu. Figure 2.1.3-2. Pressing the Ctrl + Tab keys allows the user to toggle between different screens.

Note: If your Company runs CAD from this system, then check to see what commands are “Hot Keyed”.

2.1.4 Using the Manual and Help Command

To access assistance with specific topics, click on Help on the Main Menu. Index and User Manual will then appear. Clicking on Index will show a list of topics to select from to obtain more detail about any specific topic listed. Clicking on User Manual will show a list of the chapters available for viewing.

The electronic TRIFLEX User’s Manual is located in the default directory:

\c:\ProgramFiles\PipingSolutions\TriflexWindows\Manual

The manual is furnished electronically in Adobe Acrobat (*.pdf) format and linked by chapter, figures and index. Click on a chapter and the chapter will appear on the screen.

2.2 Opening and Importing Example Piping Model Files

To open a previously created piping model, click on File in the Main Menu, select option Open and then select the file you wish. By default, the extension of TRIFLEX data files is “.dta”. The complete path is:

\c:\ProgramsFiles\PipingSolutions\TriflexWindows\Samples\Tutorial01\Tutorial01.dta

To import a previously created TRIFLEX DOS piping model, click on Utilities in the Main Menu, select option Import File and then click on DOS Triflex Job. By default, the extension of DOS TRIFLEX data files is “.job”. The complete path is:

\c:\Programs Files\PipingSolutions\TriflexWindows\Samples\Tutorial01\Tutorial01.job
To display the spreadsheet and the piping model simultaneously on a split screen as shown in Figure 2.2.0-1, open a piping model. The piping model will be displayed on the screen. Click on **Windows** on the **Main Menu** and select **Tile Vertical**. The user will see two windows; one with the piping model and the other will be blank. The user should then click on the Spreadsheet Icon in the Main Menu to obtain the spreadsheet in the blank screen. Click on any component in the piping model and the data for that component will be highlighted in the spreadsheet. Similarly, by clicking on a node in the spreadsheet, the component on the piping model will be highlighted. This is useful in identifying components in a piping model for copying, inserting and deleting.

**Note:** Models may be built using the spreadsheet and/or in graphic mode as described in section 2.3.0 of this User’s Manual.

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**Figure 2.2.0-1 Display of a Imported Model**

**Note:** In order to **PAN** hold down the SHIFT key and left Click on the mouse on the model dragging the chosen area of the model to the center position Appendix A lists Keyboard Control Key.
2.2.1 Processing a Previously Built Piping Model

There are two methods of processing a piping stress analysis. The first is to go to the Main Menu, select Calculate and then select Basic Calculation. The second method is to click on the green arrow on the Main Toolbar. Figure 2.2.1-1 depicts the “run time log” or “calculation log” sometimes known as the “Dayfile”. While the program is executing or after the program has executed, the user should look for the following terms:  

ERROR; QUIT; EXIT: Normal Termination

![Figure 2.2.1-1 Calculation Log or Dayfile](image)

If the last two lines of the dayfile are “QUIT” and “Exit: normal termination”, then TRIFLEX Windows is telling you that the execution was successfully completed. If the word “ERROR” appears, then you must examine your input data to find the error and make corrections. Please note that TRIFLEX generates this report in another window for viewing. To return to the piping model, you must delete or minimize this window.

NOTE: If you have imported a DOS TRIFLEX data file, you must re-define the required case data. To do so, Click on Setup on the Main Menu and then click on the Case Definition. The user must enter the desired case data on the dialog provided.
2.2.2 Printing Output Reports

To print output reports, click on Output on the Main Menu and then click on Print Reports on the Pulldown Menu. The screen in Figure 2.2.2-1 will appear.

![Figure 2.2.2-1 Print Report Preview Options](image1)

![Figure 2.2.2-2 Printing Options](image2)
Select the desired load cases and check the reports you wish to review and click the OK button. TRIFLEX will then give you an opportunity to select the printer and printing options as shown in Figure 2.2.2-2 and will then print the reports for you.

2.2.3 Append, Insert and Replace Mode

In order to demonstrate the modification capabilities of TRIFLEX Windows, it is best to either create a short model or refer to Figure 2.1.0-1. TRIFLEX Windows can operate in **APPEND** mode, **INSERT** mode or **REPLACE** mode. To change this mode, click on Components on the Main Menu and then click on the desired mode - Append, Insert or Replace. Alternatively, the user can click on the icons located in the bottom left corner of Main Screen to change the operating mode. See Figure 2.1.2-2 for an explanation of these Icons.

The three modes for modeling a component are as follows: **Insert** (creates component prior to highlighted or current component), **Append** (creates component following last component in a branch) and **Replace** (replaces highlighted or current component). When building a new piping model, the user must be in Append mode. When the user wishes to insert a new component in an existing piping model prior to a highlighted component, the Insert mode should be selected. When the user wishes to replace one highlighted component, the user should select the replace mode. Insert and Replace also are functional for current or last coded components when no component is highlighted. The selected mode will remain the same until the user selects a different mode.

To **Insert** one or more components, do the following:

1. Turn on the node numbers by clicking on the **Node Numbers** Icon on the Graphic Toolbar while viewing the piping model.

2. Highlight the component before which you wish to place a new component. Alternatively, you can select this component on the spreadsheet.

3. Click on the **Insert** Icon in the lower left corner.

4. Select the component you wish to insert from the component toolbar and the desired dialog will appear for you to define the component. Then click OK or press Enter.

Similarly, to **Append** a component following the last component (must be last component of a branch), click on the desired component on the component toolbar and enter the data on the dialog that appears. Then click OK or press Enter.

To **Replace** a component, do the following:

1. Turn on the node numbers by clicking on the **Node Numbers** Icon on the Graphic Toolbar while viewing the piping model.
2. Highlight the component which you wish to replace. Alternatively, you can select this component on the spreadsheet.

3. Click on the Replace Icon in the lower left corner.

4. Select the new component from the component toolbar. The desired dialog will appear for you to define the component. Then click OK or press Enter.

Modifying (Delete, Cut, Paste, Copy and Undo)

The following procedures are recommended for graphically modifying components:

Deleting

1. Click on the component(s) to be deleted.
2. Press the Del (Delete) key.

Cutting (Ctrl + x)

1. Click on the component(s) that are to be cut.
2. Click on Edit on the Main Menu and click on Cut.

Copying (Ctrl + c)

1. Click on the component(s) that are to be copied.
2. Click on Edit on the Main Menu and click on Copy.

Pasting (Ctrl + v) May be used to append one or more components (previously cut or copied components) to the TO node of the highlighted component.

1. Click on the component to which the component(s) are to be pasted.
2. Click on Edit on the Main Menu and click on Paste.

Undo (Ctrl +z) To undo the last operation, click on Edit on the Main Menu and click on Undo.

Note: Appendix A lists Keyboard Control Key.
2.3 Coding the New Sample Problem

The purpose of this section is to demonstrate the entry of data into the TRIFLEX Windows dialogs and to build a small piping model.

A piping model will be generated using the interactive screen capabilities. This model will illustrate a portion of the TRIFLEX Windows features and will provide a solid basis for utilizing all of the TRIFLEX Windows capabilities.

2.3.1 Define the Problem

Objective is to run a static operating case analysis for the piping system shown in Figure 2.3.1-1.

Figure 2.3.1-1 ISO for New Problem
**Engineering Information regarding Model to be built.**

Nominal Pipe Diameter = 4 inch

Schedule = Standard Wall

Pipe Material = Carbon Steel

Modulus of Elasticity = Installed

Insulation Material = Calcium Silicate

Insulation Thickness = 2 inches

Contents Specific Gravity = 0.85

Design Pressure = 70 psig

Design Temperature = 300 °F

Offset dimension for first anchor in the y direction = 27’-2-3/4”

Temperature for Offset = 200 °F

Valve = Flange Gate Valve

Flanges = Weld Neck Flanges

Flange Class = 150
2.3.2 Starting Triflex Windows

Begin by double clicking on the TRIFLEX Windows icon on your desktop.

After the logo screen appears for a few seconds, the main screen of TRIFLEX Windows will be displayed.

1. From Setup menu, select Project as shown in Figure 2.3.2-1

![Figure 2.3.2-1 Main Screen – Setup Options](image)

Complete the fields to define Project Name, Project Account No., Project Cost Code, Engineer’s Name/Initials, etc., as shown in Figure 2.3.2-2. These fields are not mandatory to execute an analysis of the above model.
2. From the **Setup** menu, select **Modeling Defaults** and the screen shown in Figure 2.3.2-3 will appear.

   Use the mouse or tab key to move to **Initial Node Number** field and enter **1000**.

   Use the mouse or tab key to move to **Node Increment** field and enter **10**.

   Accept the other defaults set by TRIFLEX on this screen.

3. From **Setup** menu, select **Case Definition Data** and the screen shown in Figure 2.3.2-4 will appear.

   In **Case#1**, use the mouse to place a check in the box by **Process this Case**.

   In **Case#1**, use the mouse to place a check in the box by **Perform Operating Case Analysis**.
Figure 2.3.2-3 Modeling Default

Figure 2.3.2-4 Case Definition Data
2.3.3 Coding the Components

2.3.3.1 Anchor Data Point 1000

To specify the anchor at data point 1000, you may either click on Components on the Main Menu and select the Anchor Menu Item, or click on the convenient Anchor Icon on the Component toolbar. The Anchor dialogs will be displayed as shown in Figure 2.3.3-1. All of the input fields on the tabbed Anchor dialogs are for the specification of anchor properties, movements and stiffness (translational and/or rotational).

The anchor at data point 1000 was selected as a Totally Rigid Anchor and this allows the piping system to grow vertically due to the coefficient of expansion of the vessel where it was attached. To view other Anchor dialogs:

1. Select Initial Mvmt/Rots tab – Figure 2.3.3-2

2. Select material for Offset (default is LS – Low Carbon Steel), Temperature of Offset (in our case 200°F) and type in Offset at a distance of 27 feet, 6 inches (this is typed in as 27-6). This distance is the actual distance from the true anchor to the point where the piping system components begin. TRIFLEX®Windows will calculate the vertical growth for data point 1000 from the true anchor point to the start of the piping system as shown in Figure 2.3.3-2.
3. Select the **Pipe Properties** Tab as shown in Figure 2.3.3-3.

   Use the tab key or the mouse to move to the **Nominal Diameter** field of the **Pipe Size** field group. Select 4” from that pull down menu. Notice that the **Outside Diameter** field is automatically filled in after you move from the **Nominal Diameter** field. TRIFLEX®Windows has a complete set of piping data stored and it automatically retrieves information about the outside diameter for a pipe size with a nominal diameter of 4 inches. Use the tab key or mouse to select the **Pipe Schedule** field. Select **Standard** (STD) from that pull down menu.

   Use the tab key or your mouse to move to the **Material** field of the **Pipe Material** field group. Use the pull down menu to select the **Pipe Material**.

---

Note: The pull down menu will list all material codes that TRIFLEX®Windows has stored in its internal database. The *internal TRIFLEX®Windows database* may be viewed by the user in Access (look for the **Find: triflex.mdb** file). This database is listed as: a flange, insulated material, material1, material2, pipe, structural steel, and valve database with the appropriate information under each one.
For the purpose of this example, **Low Carbon Steel (LS)** should be selected. Select carbon steel as the pipe material and note that the pipe density appears. Notice that when the pipe density appears, TRIFLEX® Windows will calculate the weight per unit length of the pipe and show it in the appropriate field. If this weight does not agree with the weight in your specifications, you may select the **User Defined** Material to change the **Density** value.

Use the tab key or the mouse to move to the **Material** field of the **Insulation** field group. Use the pull down menu to select the insulation **Material** for the **Pipe**. Use the pull down menu to select **(CS) Calcium Silicate** as the insulation material. Enter 2 in the insulation thickness field. Notice the calculation of weight is per unit length. If this weight does not agree with the weight in your specifications, select the **User Defined** Material to change **Density** value.

4. Select the **Process** Tab to enter the pressure and temperature of the piping system as shown in Figure 2.3.3-4.

5. Use the tab key or your mouse to move to the **Base Temperature** field and enter **70°F**.

6. Use the tab key or your mouse to move to the **Pressure** field and enter **70 psig**.

7. Use the tab key or your mouse to move to the **Temperature** field and enter **300°F**.

8. Select the **Code Compliance** Tab to enter the Stress Allowable Values and related data as shown in Figure 2.3.3-5.
Figure 2.3.3-4 Node 1000, Anchor Dialog, Process Tab

Figure 2.3.3-5 Node 1000, Anchor Dialog, Code Compliance Tab

9 Click the OK or press the Enter key on the Anchor dialogs to save the anchor data. An anchor will be displayed in the graphic window as shown in Figure 2.3.3-6
Figure 2.3.3-6 Node 1000, Anchor Graphic Display
2.3.3.2 Pipe Data Point 1010

To specify the pipe component, do the following

1. Select the convenient **Pipe** Icon from the **Component** toolbar.

2. Tab to or use the mouse to move to the **Delta Z** field of the **Dimensions from “From Node” to “To Node”** field group. Enter **–4’-2”** in the **Delta Z** field to indicate that the pipe segment is 4 foot 2 inches long and that the direction from the **From Node** to the **To Node** is in the negative Z direction as shown in Figure 2.3.3-7.

3. Select **Restraint** Tab as shown in Figure 2.3.3-8.

![Pipe Data Dialog](image)

Figure 2.3.3-7 Node 1010, Pipe Dialog, Pipe Data Tab

4. In the **Spring Hanger** field group, click on the **Existing Spring Hanger** check box.

5. Enter **400** lbs in **Installed Load** field and **168** lbs/in. in the **Spring Rate** field as shown in Figure 2.3.3-8.
Click **OK** to save the data and to display the Graphic View shown in Figure 2.3.3-9.
2.3.3.3 Branch Connection Data Point 1020

1. Click the Branch Connection Icon on the Components toolbar to display the Branch Connection Data dialog as shown in Figure 2.3.3-10. The node numbers of the node points are assigned by TRIFLEX automatically. If the user wishes a different labeling of the node points for the Branch Connection, use the pull down menu to select the node number or type in the node number you wish.

![Branch Connection Data Dialog](image)

Figure 2.3.3-10 Node1020, Branch Dialog, Branch Connection Tab

2. Select the Fabricated Tee radio button from Branch Connection Geometry group.

3. Tab to or use the mouse to move to the Delta Z field of the Dimensions from “From Node” to “To Node” field group. Enter –6’-4” in the Delta Z field to indicate that the pipe segment is 6 foot 4 inches long and that the direction from the From Node to the To Node is in the negative Z direction as shown in Figure 2.3.3-10.

Data Point 1020 is now defined as the midpoint of a Fabricated Tee Branch Connection and will be intensified accordingly. With the indication of the type of Branch Connection, TRIFLEX® Windows can calculate the proper stress intensification per the Piping Code specified on the Modeling Default dialog under the Setup.

To specify your own stress intensification factor at a branch connection, select the User Defined radio button from the Branch Connection Geometry group and you can enter the values you wish for the From Node and To Node fields in the Stress Intensification Factor group.
4. Click **OK** to save the pipe and branch connection data and display the Graphic View shown in Figure 2.3.3-11.

![Figure 2.3.3-11 Node 1020, Branch Joint Graphic Display](image-url)
2.3.3.4 Pipe & Anchor Data Point 1030

1. Click on the **Pipe** Icon on the **Component** toolbar.

2. Tab to or use the mouse to move to the **Delta Y** field of the **Dimensions from “From Node” to “To Node”** field group. Enter **–3′-11-1/4″** in the **Delta Y** field to indicate that the pipe segment is 3 foot 11 1/4 inches long and that the direction from the **From Node** to the **To Node** is in the negative Y direction as shown in Figure 2.3.3-12.

3. Click **OK** to save the pipe data.

![Figure 2.3.3-12 Node 1030, Pipe Dialog, Pipe Data Tab](image)

4. Click on the **Anchor** Icon on the **Component** toolbar.

5. Verify that the number **1030** is in the **Node Label** field of the **Element** field group for the anchor as shown in Figure 2.3.3-13.

6. Click **OK** to save the anchor data and display the Graphic View shown in Figure 2.3.3-14.
Figure 2.3.3-13 Node 1030, Anchor Dialog, Type Location Data Tab

Figure 2.3.3-14 Node 1030, Pipe and Anchor Graphic Display
2.3.3.5 Elbow Data Point 1040

1. Click on the Elbow Icon on the Component toolbar to display the Elbow Data dialog as shown in Figure 2.3.3-15.

2. Use the pull down menus to select the correct node numbers for the From Node - 1020 and the Tangent Intersection Node - 1040.

3. Tab to or use the mouse to move to the Delta Z field of the Dimensions from "From Node" to "To Node" field group. Enter -4-3-3/16" in the Delta Z field to indicate that the elbow and preceding pipe segment is 4 foot 3 3/16 inches long and that the direction from the From Node to the To Node is in the negative Z direction as shown in Figure 2.3.3-15.

4. Enter 4’ in the Delta X field of the Dimension from “Tangent Intersection To Next Component” group.

Figure 2.3.3-15 Node 1040. Elbow Data Dialog, Elbow Data Tab

5. Click OK to save the elbow data and display the Graphic View shown in Figure 2.3.3-16.
2.3.6 Branch Connection

2.3.3.6 Branch Connection Data Point 1050

1. Click the Branch Connection Icon on the Components toolbar to display the Branch Connection Data dialog as shown in Figure 2.3.3-17. The node numbers of the node points are assigned by TRIFLEX automatically. If the user wishes a different labeling of the node points for the Branch Connection, use the pull down menu to select the node number or type in the node number you wish.
Notice that the Branch Connection Geometry defaults to “Welding Tee S.I. Only \( Tc > 1.5*t \)”. TRIFLEX® Windows will default to this selection unless you click on another branch connection type.

2. Tab to or use the mouse to move to the \textbf{Delta X} field of the \textbf{Dimensions from “From Node” to “To Node”} field group. Enter 4' in the \textbf{Delta X} field to indicate that the pipe segment is 4 foot 0 inches long and that the direction from the \textbf{From Node} to the \textbf{To Node} is in the plus X direction as shown in Figure 2.3.3-17.

Data Point 1050 is now defined as the midpoint of a Welding Tee Branch Connection and will be intensified accordingly. With the indication of the type of Branch Connection, TRIFLEX® Windows can calculate the proper stress intensification per the Piping Code specified on the \textbf{Modeling Default} dialog under the \textbf{Setup}.

4. Select \textbf{Restraint} Tab as shown in Figure 2.3.3-18.
In the **Translational Restraint Group** field group, click on the **Check Box** for the +Y restraint.

Figure 2.3.3-18 Node 1050, Branch Connection Dialog, Restraint Data Tab

Figure 2.3.3-19 Node 1050, Branch Connection Dialog Click **OK** to save the pipe and branch connection data and display the Graphic View shown in Figure 2.3.3-19.

Figure 2.3.3-19 Node 1050, Branch Connection Graphic Display
2.3.3.7 Valve Data Point 1060

Please note that the piping system example calls for a flanged valve to be entered with a preceding segment of pipe between data point 1050 and data point 1060. You may enter the preceding pipe as one data point and the flanged valve as another data point, or you may enter both in one data point as we have done in the following coded dialogs. If desired, the user could also model each flange separately with one data point each and the valve without flanges with another data point. TRIFLEX Windows provides substantial modeling flexibility for the user.

To model the flanged valve with a preceding segment of pipe on one data point dialog, do the following:

1. Click on the **Valve** Icon on the **Component** toolbar. TRIFLEX will display the **Valve Data** dialog as shown in Figure 2.3.3-20.

2. Tab to or use the mouse to move to the **Delta X** field of the **Dimensions from “From Node” to “To Node”** field group. Enter 5'-10-1/8" in the Delta X field to indicate that the total length of the pipe segment and the flanged valve is 5 foot 10 1/8 inches long and that the direction from the **From Node** to the **To Node** is in the plus X direction as shown in Figure 2.3.3-20.

3. In the **Valve Type** field group, click on the radio button for **Flanged Valve**.

4. In **Valve Data** field group, TRIFLEX will display **“Flanged AAAT Std Valve”** as the default. For the example problem, a flanged gate valve with weld-neck flanges has been specified. Therefore, click on the pull down menu in the Valve Type field and select the **“Flanged Gate Valve”**. The class of 150 for the flanges is correct, so no action on the user’s part is required. The other data displayed in the Valve Data field group is displayed for the user to know what data TRIFLEX is using.

5. In the **Flange Data** field group, TRIFLEX will display **“AAAT Std Flanges”** as the default. Click on the pull down menu in the Flange Type field and select the **“Weld Neck Flange”**. The other data displayed in the Flange Data field group is displayed for the user to know what data TRIFLEX is using. In addition, TRIFLEX defaults to flanges on both ends as shown in the check boxes below the flange data.

6. Below the flange data in the **“Delta Dimension Coded To”** field group, TRIFLEX allows the user to specify the location of the data point on the valve. For our example, we will accept the TRIFLEX default of locating the data point at the weld point on the far end of the valve.
Figure 2.3.3-20 Node 1060, Valve Dialog, Valve Data Tab

Click **OK** to save the pipe and valve data and display the Graphic View shown in Figure 2.3.3-21.
2.3.3.8 Pipe & Anchor Data Points 1060 through 1070

1. Click on the **Pipe** Icon on the **Component** toolbar.

2. Tab to or use the mouse to move to the **Delta X** field of the **Dimensions from “From Node” to “To Node”** field group. Enter \(-3'-3-3/8"\) in the **Delta X** field to indicate that the pipe segment is 3 foot 3 3/8 inches long and that the direction from the **From Node** to the **To Node** is in the plus X direction as shown in Figure 2.3.3-22.

3. Click **OK** to save the pipe data.

4. Click on the **Anchor** Icon on the **Component** toolbar.

5. Verify that the number **1070** is in the **Node Label** field of the **Element** field group for the anchor as shown in Figure 2.3.3-23.

6. Click **OK** to save the anchor data and display the Graphic View shown in Figure 2.3.3-24.
Figure 2.3.3-23 Node 1070, Anchor Dialog, Type Location Tab

Figure 2.3.3-24 Node 1070, Pipe & Anchor Data Graphic Display
1. Click on the **Pipe** Icon on the **Component** toolbar.

2. Use the pull down menus to select the correct node numbers for the **From Node - 1050** and the **To Node - 1080**.

3. Tab to or use the mouse to move to the **Delta Z** field of the **Dimensions from “From Node” to “To Node”** field group. Enter **–5'-2-1/8”** in the **Delta Z** field to indicate that the pipe segment is 5 foot 2 1/8 inches long and that the direction from the **From Node** to the **To Node** is in the negative Z direction as shown in Figure 2.3.3-25.

Figure 2.3.3-24 Node 1070, Pipe & Anchor Data Graphic Display

4. Click **OK** to save the pipe data.

5. Click on the **Anchor** Icon on the **Component** toolbar.

6. Verify that the number **1080** is in the **Node Label** field of the **Element** field group for the anchor as shown in Figure 2.3.3-26.

7. Click **OK** to save the anchor data and display the Graphic View shown in Figure 2.3.3-27.

Figure 2.3.3-25 Node 1080, Pipe Data Sheet, Pipe Data Tab

The system should graphically look like Figure 2.3.3-27. To display the coordinates axis system on the model, click on the **Toggle Axis** Icon on the **Graphic Toolbar**.
Figure 2.3.3-26 Node 1080, Anchor Data Sheet, Type Location Tab

Figure 2.3.3-27 Node 1080, Pipe & Anchor Data Graphic Display
2.3.4 Executing a Static Analysis

To process a TRIFLEX® Windows analysis of the piping system you just entered, click on the Green Arrow icon in the Main Menu or from the Setup menu, select the Basic option as shown in Figure 2.3.4-1.

![Figure 2.3.4-1 Main Screen, Calculate Pull-Down Menu](image)

Note: A case number must be filled in before TRIFLEX® Windows will perform the stress calculations.

Once TRIFLEX has been instructed to process the analysis, the program will begin executing the stress calculations. The status of the calculations will be displayed in the TRIFLEX® Windows screen.

While the calculation is in progress, the Calculation Ready/Stop Icon will be displayed as a red stop sign as shown in Figure 2.3.4-2. To stop the calculation process, click the Calculation Ready/Stop Icon and the calculations will be immediately aborted.

Upon completion of the calculation process, the Calculation Ready/Stop Icon will be returned to the green arrow ready state as shown in Figure 2.3.4-1.
2.3.5 View Run Output

To view the results of the stress calculations in spreadsheet format, do the following:

1. From the Output Pull Down menu, select View Results. See Figure 2.3.5-1 below for this menu. The TRIFLEX®Windows calculation results will be displayed as shown in Figure 2.3.5-2.

![Figure 2.3.5-1 Output Pull-Down Menu](image)

2. Select the Load Case that you wish to view using the Load Case pull down menu as shown in Figure 2.3.5-2.

3. Select the report that you wish to view using the Type Report Selector pull down menu as shown in Figure 2.3.5-3.
Figure 2.3.5-2 Output Load Case Pull-Down Menu

Figure 2.3.5-3 Output Type Pull-Down Menu
To view Code Compliance Report

4. From the **Output Pull Down** menu, select **Piping Code Report** similar to that shown in Figure 2.3.5-1. The TRIFLEX®Windows calculation results will be displayed as shown in Figure 2.3.5-4.

![Figure 2.3.5-4 Output Code Compliance Report](image)

To view the piping model output graphically,

5. Click on the **OutPut Display** icon in the **Main Menu** as shown in Figure 2.3.5-5 or, from the **Output Pull Down** menu, select **Select Output Graphic Display** similar to that shown in Figure 2.3.5-1. An OutPut display screen will appear in the middle of the screen.

6. In the **Output Display** screen, click on the **Display Pull Down** menu as shown in Figure 2.3.5-6 to select the calculated output data that you wish to view.

7. If you select deflections, rotations, forces or moments, you must then select the **Line of Action** that you wish. Under Line of Action, TRIFLEX will default to Resultant values unless you specify another category. Then click OK.

If you select any of the stresses calculated by TRIFLEX, then you must select either **Absolute Value** or **Sign (+/-)** from the Stress Display group. Under the Stress Display group, TRIFLEX will default to Absolute values unless you specify Sign (+/-). Then click OK.
Note: If your piping model does not appear on the screen at this point, then press Control + Tab to toggle between all screens available describing the piping system. Stop when you see the piping model. Alternatively, you can click on the Spreadsheet Icon to toggle between the spreadsheet view and the piping model.

Figure 2.3.5-5 Output Graphic, Output Display Menu

Figure 2.3.5-6 Output Display Screen, Display Pull Down Menu
Figure 2.3.5-7 Output Graphic Screen

Figure 2.3.5-8 Output Graphic – Deformed Shape
To view the piping model with a superimposed deformed shape,

8. In the Output Display screen shown in Figure 2.3.5-6, click on the Display Pull Down menu and select Deflection.

9. Then on the Output Display screen, click on the check box for Show Center Line Deviation and enter a number in the Scale field indicating the multiplier factor to be applied to the deflection shown on the model. Then click OK. A screen showing the deformed piping model will then appear as shown in Figure 2.3.5-8.
2.3.6 Printing

TRIFLEX® Windows has an extremely easy to use facility for printing output reports and screens.

1. From the Output Pull Down menu, select Preview Report or Print Report similar to that shown in Figure 2.3.6-1. The Report Print (Print Static / Dynamic Reports) screen will then appear.

   ![Output Pull-Down Menu](image)

   Figure 2.3.6-1 Output Pull-Down Menu

2. In Print Report or Preview Report screen, select the Loading Case and the reports from the Available Report group by placing a check in the box adjacent to each desired report as shown in Figure 2.3.6-2.

3. A Preview Report sample screen is shown in Figure 2.3.6-3.
Figure 2.3.6-2 Report Print Menu

Figure 2.3.6-3 Report Print Preview Sample
This completes our TRIFLEX® Windows tutorial. We have by no means covered all the capabilities of the program, but you should have a better understanding of the general approach for building a piping model, executing an analysis and reviewing the results.

To exit TRIFLEX® Windows, click EXIT under FILE. Please remember before you exit TRIFLEX to save your model. To do so, from the File Pull Down menu, select Save As similar to the procedure used in most Windows programs.
# APPENDIX A

## TRIFLEX® Windows Command and Shortcut Keys

**(Graphics Mode)**

<table>
<thead>
<tr>
<th>COMMANDS</th>
<th>SHORTCUTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Help</td>
<td>F1 (not active currently)</td>
</tr>
<tr>
<td>• Worksheet Toggle</td>
<td>F4</td>
</tr>
<tr>
<td>• Start Calculation</td>
<td>F5</td>
</tr>
<tr>
<td>• Print Report Preview</td>
<td>F7</td>
</tr>
<tr>
<td>• Print Report</td>
<td>F8</td>
</tr>
<tr>
<td>• Move to End</td>
<td>END</td>
</tr>
<tr>
<td>• Edit Current Component</td>
<td>F9</td>
</tr>
<tr>
<td>• Move to First Component</td>
<td>HOME</td>
</tr>
<tr>
<td>• Insert</td>
<td>INS</td>
</tr>
<tr>
<td>• Move to Next Component</td>
<td>PGDN</td>
</tr>
<tr>
<td>• Move to Previous Component</td>
<td>PGUP</td>
</tr>
<tr>
<td>• Copy</td>
<td>CTRL + C</td>
</tr>
<tr>
<td>• Cut</td>
<td>CTRL + X</td>
</tr>
<tr>
<td>• Delete</td>
<td>DEL</td>
</tr>
<tr>
<td>• New</td>
<td>CTRL + N</td>
</tr>
<tr>
<td>• Open</td>
<td>CTRL + O</td>
</tr>
<tr>
<td>• Paste</td>
<td>CTRL + V</td>
</tr>
<tr>
<td>• Print</td>
<td>CTRL + P</td>
</tr>
<tr>
<td>• Save</td>
<td>CTRL + S</td>
</tr>
<tr>
<td>• Undo</td>
<td>CTRL + Z</td>
</tr>
</tbody>
</table>
- “Arrow” moves model  
  ARROW KEYS
- Bring up “Start”  
  CTRL + ESC
- Capture display to Clipboard  
  ALT + PRTSC
- Change pointer/manipulator  
  ESC
- Change pointer to manipulator  
  ALT + SHIFT
- Change to manipulator (temporary)  
  ALT
- Display all available windows  
  ALT + ESC
- Manipulator moves model  
  SHIFT
- Next (toggle between graphics  
  CTRL + F6
  & spreadsheet input)
- Toggle through all available windows  
  ALT + TAB
APPENDIX B

Procedure to read

*.IN file generated in TRIFLEX Windows into TRIFLEX DOS

The .IN file is created by TRIFLEX Windows during of the run session of the model. This file will be saved with the same name as the name of piping model (by default the name is “untitled”) and has .IN extension.

TRIFLEX Windows will create a .IN file for each defined load case.

Locations where the .IN are saved are: drive:\...\name of the model\1 for the load case 1, drive:\...\name of the model\2 for the load case 2 and so on.

In order to read this files in TRIFLEX DOS follow the next steps:

1. Copy the .IN file to the folder Drive:\AAALIB (the default directory for TRIFLEX DOS installing) to the directory where the TRIFLEX DOS was installed.

   TRIFLEX Release 2.7.1 - Primary Options Menu
   Copyright 1986-99 A AA Technology & Specialties Co. Inc.
   Houston, Texas 77041-5114, USA
   Current Job Tree: c:\triflex
   Current Job Code: TESTTR

   1. Job Definition   Select Job / Setup New Job
   2. Data Entry       Pipe Config. Stats/Dynamics
   3. Perform TRIFLEX Analysis
   4. Display / Plot / Print TRIFLEX Results
   5. TRIFLEX Utilities Menu

   select an option (1 -> 5) or [Esc] to return to DOS

2. Run TRIFLEX DOS and select option 5. TRIFLEX Utilities Menu
2. Select Option 3 – Convert into Triflex Format

3. Select Option 5 – Convert Triflex Keyword Files To Triflex Node Data
3. Using arrows button select which file you want to convert (in our case TESTTR) and press F10

5. Press any key

Conversion of AAA-Base File: C:\AAALIB\TESTTR.AAA
Establishing AAA Front End Job: c:\triflex\TESTTR\TESTTR

End of Conversion

CAUTION: Converted data may be INCOMPLETE
Scrutiny of the newly generated TRIFLEX job is advisable
Press any key to reach the Node Data Spreadsheet
6. You can see, edit run, and save the imported pipe model

<table>
<thead>
<tr>
<th>FROM</th>
<th>TO</th>
<th>TYPE</th>
<th>CHNGE</th>
<th>RST</th>
<th>SIF</th>
<th>7 Nodes</th>
<th>5 Last</th>
<th>30 End</th>
<th>30 High</th>
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<tbody>
<tr>
<td>5</td>
<td>10</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
<td>F2: Search</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>15</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
<td>F1: Help</td>
<td>F5: Block</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>20</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
<td>F4: Plot</td>
<td>F3: Quit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>25</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>Del: REMOVE the highlighted node</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>30</td>
<td>R</td>
<td></td>
<td></td>
<td></td>
<td>Ins: INSERT one or more nodes at the highlight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Enter: DISPLAY detail screen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F10: for highlighted node</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

↑: Up 1 row   ↓: Down 1 row
Home: Move to top row
End: Move to bottom row
Pg Up: Move up 1 page
Pg Dn: Move down 1 page
APPENDIX B

Procedure to read

* .IN file generated in TRIFLEXDOS into TRIFLEX Windows

It is possible to import .IN files and .JOB files written by TRIFLEXDOS in a new empty file opened by TRILEX Window.

In order to read these files in TRIFLEX DOS follow the next steps:

1. Start TRIFLEX Windows program or if it is already started and a file opened select, File and New option from Main Menu.

2. From Main Menu select Utilities, Import Files and Triflex Keyword option.

3. Select the directory where the .IN file is located, select the .IN file and press the OPEN button.

4. The graphic of the pipe system will become visible on the screen.

   Follow the rules for editing, running and saving which are specific for TRIFLEX Windows.
When installing on a NT machine, the installer needs to login as the NT administrator.

Insert the CD into the CD Reader, the following screen will appear.

Select Install Triflex Windows and follow the instructions.

When the following screen appears enter the fields with the proper information. A proper serial number or the word DEMO must be entered before the “Next” button is made available.

Here you can specify the folder where you want TRIFLEX Windows to be installed. The default settings are:

C:\ProgramFiles\PipingSolutions\TriflexWindows
The next screen will just tell you if you have enough space to install. Hit next, to proceed with the installation. The status bar will tell you the progress of the installation.

Triflex Windows is now installed, you can view the release notes by simply hitting “Finish”.

To Run TRIFLEX Windows start Windows Explorer and locate the TRIFLEX executable.

To make a shortcut, simply drag and drop the TRIFLEX icon over to your desktop.
NETWORK INSTALLATION

When installing on a NT machine, the installer needs to login as the NT administrator. Network installation requires a couple of extra steps. The following works fine with Netbios and TCP/IP types of networks.

If you are unfamiliar with the inner workings of Windows and Networking, please have the IT-Department to do the following:

SERVER

It is not necessary to have a full installation of TRIFLEX Windows on the server. The HASP folder can be copied over to the server from the client. However, both SERVER and CLIENT can reside on same computer.

1. Now we need to set up the shortcut for the NHSRVW32 program. Since our Nethasp.ini (this is the user part not the server) is looking for the License Manager called “TRIFLEX”. WE need to make sure we start the LM and give it a name.

2. To give the LM a name, make a shortcut to the NHSRVW32.

3. For NT-Systems, we recommend to place the NHSRVW32 Shortcut at <SysDRV>\WINNT\Profiles\All Users\Start Menu\Programs\Startup location. This will assure the access to TRIFLEX Application no matter
which machine was designated as dedicated server or who is working on it.

Right Click on the Icon, left click on Properties Add on to the target line – srvname=TRIFLEX

4. Right Click on the Icon, left click on Properties Add on to the target line – srvname=TRIFLEX

5. Add on to the target line – srvname=TRIFLEX

CLIENT

Move the Nethasp.ini from the HASP folder, which is located in the TRIFLEX Windows folder.

This is a typical content of the Nethasp.ini file.