PD2CAEPIPE™- Plant Design-to- CAEPIPE Translator (for CADMATIC)

1.0 Installing Program

To install PD2CAEPIPE on Windows, Download the product and execute the followings steps:

1. Run the program "SETUP.EXE" and follow the instructions as they appear on the screen.

2. After successful installation of the program, create an environmental variable with the name “CADMATIC2CAEPIPE” and set the value of the variable as “CADMATIC2CAEPIPE_Installed_Path” (assuming the PD2CAEPIPE is installed in “d:\cad2caepipe”, the value would be “d:\cad2caepipe”).

3. The environmental variable can be set automatically as given below.

    - Open the Control Panel window and open the System Properties window by double clicking the “SYSTEM” icon from within the Control Panel window. Select the “Environment Variables” button from the “Advanced” tab for Windows 2000 or select the Environment tab for Windows NT and click “NEW” button.

    - Then enter in the Variable prompt “CADMATIC2CAEPIPE”, and “PD2CAEPIPE_Installed_path” (where the PD2CAEPIPE is installed) in the Value prompt, for example “d:\cad2caepipe.

    - Once entered, select the “Set” button to confirm.

2.0 Neutral File Extraction

1 Load the CADMATIC Plant Modeler and run the macro “CADMATIC.mac” available in the installed path of PD2CAEPIPE\ through “Macros->Select and Run”. The following form appears.

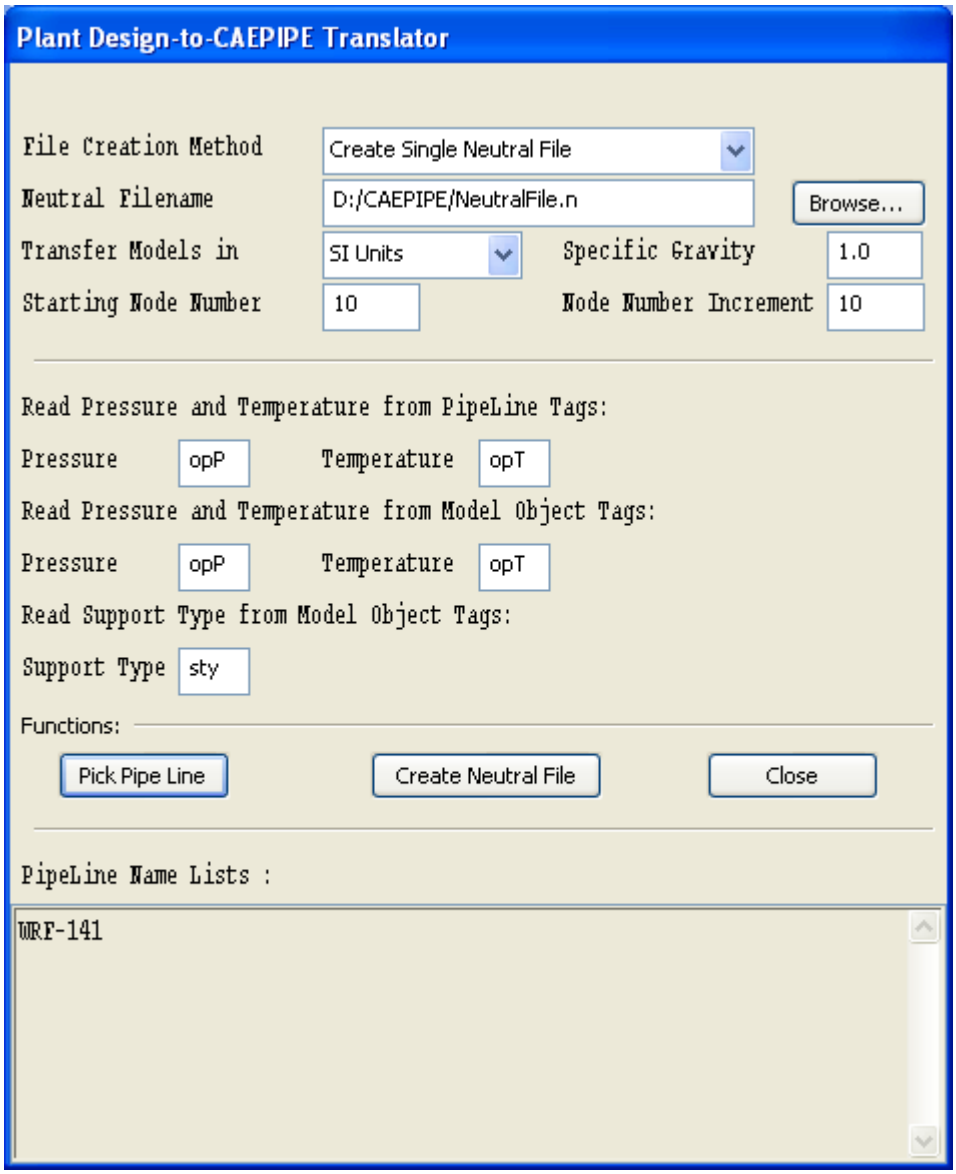
2 Pipes selected for Transfer need to be checked for the following.

a. Pressure and Temperature of the Pipeline defined using Pipeline Tags or Model Object Tags.

b. By default, the analysis code is set to “B31.3”. The Analysis code can be changed by creating a user defined tag to the CADMATIC project with the name “acO” (Analysis Code) and assigning the same to the pipeline.

c. Support type can be transferred to CAEPIPE by creating a user-defined tag to the CADMATIC project with the name “sty” (Support Type) or any other tag name and assigning the same tag to the component connecting the pipe and the pipe support such as U-clamp, O-clamp, etc., at each pipe support location. The tag created as stated above should be set a value as given in the field #1 of the access db “SupportType.mdb” available in the installed directory of CAEPIPE to transfer the support type.

d. If the MMT_LEAVE_GASKET_GAPS is set to 1, then the translator treats the same as real gaps and puts an anchor at that location.



3 Selecting the option “Create Multiple Neutral Files” creates a set of files in the specified directory. The names of the files are identical to the name of the pipe(s).

4 Secondly, selecting the option “Create Single Neutral File” creates one neutral file for all the items in the specified neutral file name.

5 Selecting the option “SI Units” transfers the Pipes details in SI units i.e. Length related dimensions such as OD, Nominal Size etc in mm, Temperature in Deg C, Pressure in bar, Weight in Kg, Density in Kg/m3, Translational Stiffness in N/mm, Rotational stiffness in N-m/deg to the neutral file.

6 Similarly selecting the option “ENGLISH Units” transfers Pipes details in ENGLISH units i.e. Length related dimensions such as OD, Nominal Size etc in Inch, Temperature in Deg F, Pressure in psi,

Weight in lb, Density in lb/in3, Translational Stiffness in lb/in, Rotational Stiffness in lb-in/deg to the neutral file

7 Enter the Starting Node number and Node increment value in the appropriate field. By default, the Starting Node number and Node increment are set to 10 and 10 respectively.

8 The Specific Gravity of the fluid (with respect to water) is set to 1.0 by default. User can change Specific Gravity by entering the appropriate value in text box.

9 The Function 'Pick Pipe Line' lets the user to select the objects from the graphics. The user can select entire Pipelines or the portion of the Pipes.

10 The option 'PipeLine Name Lists' displays the names of the pipeline thus selected through graphics.

3.0 Limitations

1. Insulation Density and Insulation thickness are not transferred to CAEPIPE at this time.

2. Corrosion allowance and Mill tolerance are not transferred to CAEPIPE at this time even though the provision is available in the Neutral File.

3. Lining Density and Lining Thickness are not transferred to CAEPIPE at this time.

4.0 Reference

Loads

Temperature and Pressure values entered at Pipes and Standard components via OpT and opP shall be transferred to CAEPIPE. Hence, user should fill these attributes with appropriate values depending upon the Units of transfer. I.e., If you wish to transfer the model in SI units, then the value enter for Temperature and Pressure should be in Deg C and kg/cm2 respectively. On the other hand, if you wish to transfer the model in English Units, then the Temperature and Pressure values shall be entered in Deg F and psi respectively.

Fluid Density

Specify the Specific Gravity of the fluid (with respect to water) during the transfer of the model.

Weight

The weights of Valve, Instruments, Flanges, etc. are extracted from the Dimension Table through first mass quantity type attribute. If defined/available in the Database, the program extracts the information and transfer to CAEPIPE.

OD, Wall Thickness and Nominal Size

Nominal Size is extracted from the first NS Quantity type of Dimension Table. Similarly, OD and Wall Thickness is extracted from first diameter and first wall thickness quantity type respectively from CADMATIC Dimension Table. For reducers and tees, the arrive OD and Thickness will be read from first Diameter and Wall Thickness quantity type and leave OD and Thickness will be read from second Diameter quantity type and Wall Thickness quantity type.

Boundary Conditions

In the current version, the program will “Anchor” the Pipe Ends only when they are connected to a Nozzle otherwise it leaves them as open. On the other hand, if one end of the pipe is connected to another Branch and if that Branch is not included as the part of the Stress model, then the program will also anchor that end automatically.

For more clarity, consider the following examples. If one end of the pipe is connected to a Pump Nozzle and the other end is not connected to any equipment nozzle/object, then the program will anchor the first end and leave the other end as free (i.e., do not create any support). On the other hand, if one end of the pipe is connected to a Nozzle and the other end is connected to another Branch and that Branch is not included in the Stress model, then the program will anchor both the ends automatically.

Supports

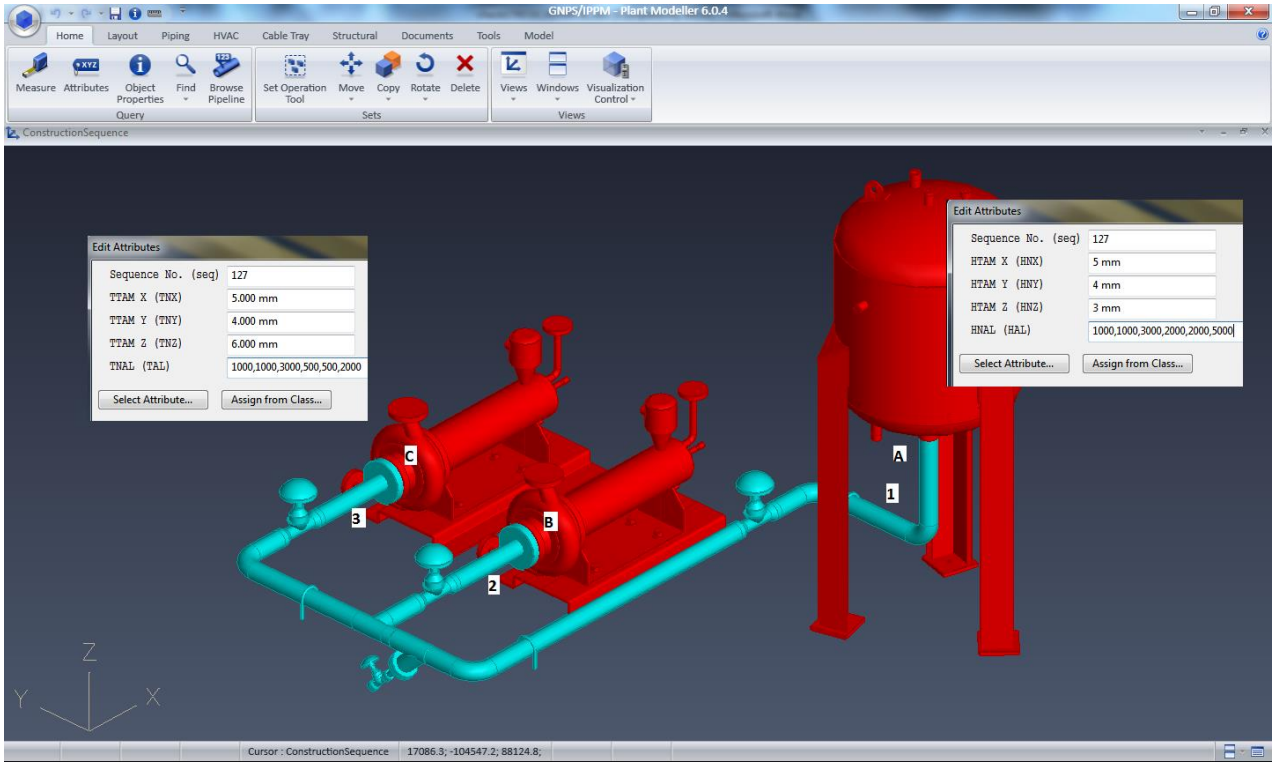
The translator checks for user defined attribute “sty”. If available then reads the details of support from this attribute and write the same to the neutral file.

The attributes defined above should be set a value as given in the field #1 i.e., “PdSupport” of the access db “SupportType.mdb”, when the user selects the option “Use Mapping DB” in PD2CAEPIPE Translator for transferring the support details to CAEPIPE. Otherwise, the attribute should be filled with values as specified in **Appendix E** of PD2CAEPIPE User’s Manual supplied along with the product. For more details on transferring support information to CAEPIPE with the option “Without Using Mapping DB”, refer to **Appendix D** of PD2CAEPIPE User’s Manual (PD2CAEPIPE.pdf).

Thermal Anchor Movement (TAM)

Thermal Anchor Movement (TAM) values entered at User defined attributes HNX, HNY and HNX or TNX, TNY and TNZ (attributes need to be added and assigned for Model Object through CADMATIC COS and their values to be assigned in Plant Modeller using the option “Whole Pipeobject”) corresponding to Start or End of pipe run is transferred to CAEPIPE. In other words, TAM at starting of the Pipe run should be entered at HNX, HNY and HNZ of Pipe Run. On the other hand, TAM at the end of the Pipe run should be entered at TNX, TNY and TNZ of Pipe run. TAM values should be defined in “mm” for CADMATIC projects in SI units and in “Inch” for CADMATIC project in English units.

For more clarity, consider the following example shown in figure below. Point A is connecting to a Tank. The TAM values corresponding to this point should be defined by selecting the Pipe run 1 and their values should be entered to attributes “HNX”, “HNY” and “HNZ”. Similarly, TAM values for Point B and C should be defined at attributes “TNX”, “TNY” and “TNZ” of the Pipe runs 2 and 3 respectively.



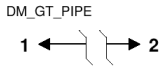
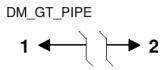
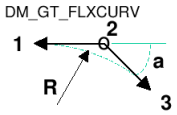
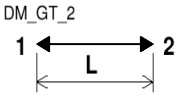
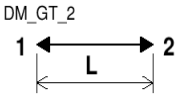
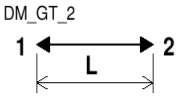
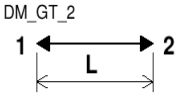
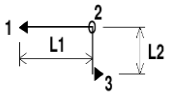
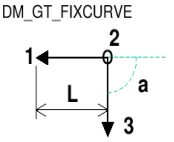
User defined Equipment Nozzle Allowable Loads

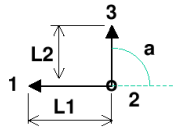
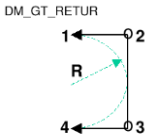
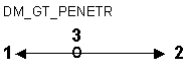
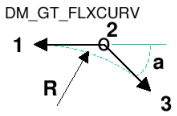
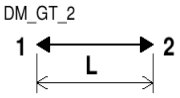
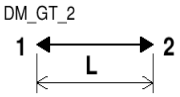
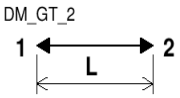
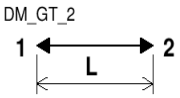
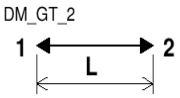
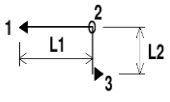
Equipment Nozzle Allowable Loads (forces and moments) provided by the equipment manufacturer or calculated using Applicable codes / Finite Element Methods can also be entered at Pipe runs as using the User Defined attributes HAL and TAL in global X, Y and Z directions at Start or End of Pipe run respectively in the format FX, FY, FZ, MX, MY and MZ as explained above for entering TAM values. Please note, the Equipment Nozzle Allowable Loads entered at HAL / TAL should be separated using “,” as shown in the figure above. In addition, the force values should be entered in “lb” for English units and in “N” for SI units. Similarly, the moment values should be entered in “ft-lb” for English units and in “Nm” for SI units.

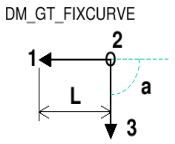
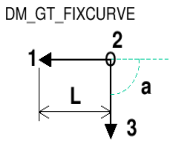
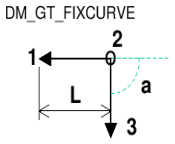
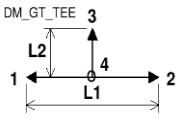
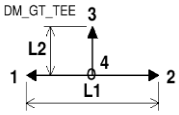
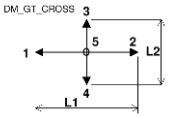
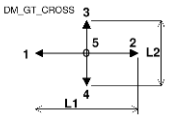
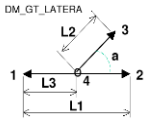
The allowable thus defined are compared against calculated loads and shown / printed in Support Load Summary of CAEPIPE. If the calculated loads exceed the allowable, they are highlighted in red.

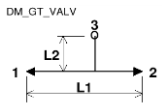
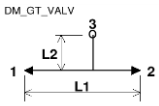
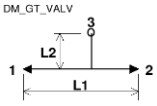
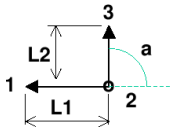
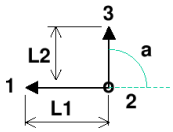
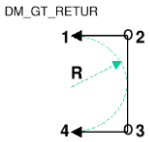
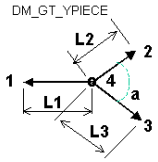
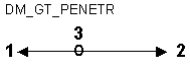
5.0 CADMATIC to CAEPIPE Component Mapping

The type of component available in Plant Design is mapped with CAEPIPE component and listed below for reference. If the CADAMTIC components meets the GTYPE and the constraints as listed in the table below, then PD2CAEPIPE translator transfers the component available in Plant Design to CAEPIPE as mentioned in the column “CAEPIPE Component”.

Plant Design Software Component Description	Constraints	Geometric Types	CAEPIPE Component	Key Word in Neutral File
If modeled as Piping Components				
Straight Pipes	DM_GT_PIPE = TRUE & Bend Angle = 0		Pipe	PI
Free Bends	DM_GT_PIPE = TRUE & Bend Angle > 0		Bend	EL
Flexible Curves	DM_GT_FLXCURVE = TRUE		Bend	EL
Flanges	DM_GT_2P = True & Primary Connection Code = 1or 3 (Connection Type is Flange)		Rigid Element or Pipe with Flange	FL
Conc. Reducer	DM_GT_2P = True & 2nd Nominal Size > 0		Reducer Concentric	RD
Straight Pipes	DM_GT_2P = True & Keyword in corporate catalogue of CADMATIC has “*PIPE*” e.g. Seamless Straight Pipe		Pipe	PI
Flow meters, Adaptor, Flexible hoses, Caps	DM_GT_2P = True		Rigid Element	RB
Eccentric Reducer	DM_GT_3PDIRFIX = True		Reducer Eccentric	ER
Fixed Angle Curves	DM_GT_FIXCURVE = True		Bend	EL

Plant Design Software Component Description	Constraints	Geometric Types	CAEPIPE Component	Key Word in Neutral File
Asymmetric Curves	DM_GT_ASYMCURVE = True		Bend	EL
U-Piece	DM_GT_RETURN = True		Bend	EL
Sliding Sockets, Unions	DM_GT_PENETR = True		Rigid Element	RB
If modeled as Standard Components				
Filter / Strainer	DM_GT_FLXCURVE = TRUE		Rigid Element	RB
Some Flanges	DM_GT_2P = True & Primary Connection Code = 1 (Connection Type is Flange)		Rigid Element or Pipe with Flange	FL
Straight Pipes	DM_GT_2P = True & Keyword in corporate catalogue of CADMATIC has "*PIPE*" eg Seamless Straight Pipe		Pipe	PI
Valves	DM_GT_2P = True & Keyword in corporate catalogue of CADMATIC has "*VALVE*" eg Ball check valve		Valve	VA
Conc. Reducer	DM_GT_2P = True & 2nd Nominal Size > 0		Reducer Concentric	RD
Flow meters, Adaptor, Flexible hoses	DM_GT_2P = True		Rigid Element	RB
Eccentric Reducer	DM_GT_3PDIRFIX = True		Reducer Eccentric	ER

Plant Design Software Component Description	Constraints	Geometric Types	CAEPIPE Component	Key Word in Neutral File
Fixed Angle Valves	DM_GT_FIXCURVE = True & Keyword in corporate catalogue of CADMATIC has "*VALVE*" eg Pressured rig-valve WDP		Valve	VA
Straight Pipes	DM_GT_FIXCURVE = True & Keyword in corporate catalogue of CADMATIC has "*PIPE*" eg Seamless Straight Pipe		Pipe	PI
Filter / Strainer	DM_GT_FIXCURVE = True		Rigid Element	RB
3 Way Valves	DM_GT_TEE = True & Keyword in corporate catalogue of CADMATIC has "*VALVE*" eg Three-way valve Wafer		Three Rigid Elements or Three Pipes with Concentrated Mass	3W
Welding TEE	DM_GT_TEE = True		Pipes with Branch SIF (Welding TEE)	TW
4 Way Valves	DM_GT_CROSS = True & Keyword in corporate catalogue of CADMATIC has "*VALVE*" eg Four-way valve Wafer		Four Rigid Elements or Four Pipes with Concentrated Mass	4W
Crosses	DM_GT_CROSS = True		Four Pipes with Branch SIF (Welding TEE)	CR
Lateral TEE	DM_GT_LATERAL = True		Pipes with Branch SIF (Welding TEE)	TW

Plant Design Software Component Description	Constraints	Geometric Types	CAEPIPE Component	Key Word in Neutral File
Valves	DM_GT_VALVE = True & Keyword in corporate catalogue of CADMATIC has "*VALVE*" eg Ball Valve		Valve	VA
Reduced Valves	DM_GT_VALVE = True & 2nd Nominal Size > 0 & Key word in corporate catalogue should not have "*valve*".		Reducer Concentric	RD
Flow meters, Pressure gauges, Manometers, Strainers	DM_GT_VALVE = True		Rigid Element	RB
Asymmetric Valves	DM_GT_ASYMCURVE = True & Keyword in corporate catalogue of CADMATIC has "*VALVE*" eg Pressured rig-valve WDP		Valve	VA
Asymmetric Curves	DM_GT_ASYMCURVE = True		Bend	EL
U-Piece	DM_GT_RETURN = True		Bend	EL
Y-piece	DM_GT_YPIECE = True		Pipes with Branch SIF (Welding TEE)	TW
Sliding Sockets, Unions	DM_GT_PENETR = True		Rigid Element	RB