PD2STPRO™ User's Manual

MANUALS/PD2STPRO/man1/doc1

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Plant Design-to-STAAD.Pro ™

User's Manual

Server Version 2.xx

SYSTEMS, INC.

INDIA PVT.LTD

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1. Introduction

Plant Design-to-STAAD.Pro Translator (PD2STPRO) program is a stand-alone program, which shall be used for transferring section geometry, their properties, support condition etc from 3D Plant Design Software to STAAD.Pro

The sequence of this translator operation is shown graphically in Figure 1-1.

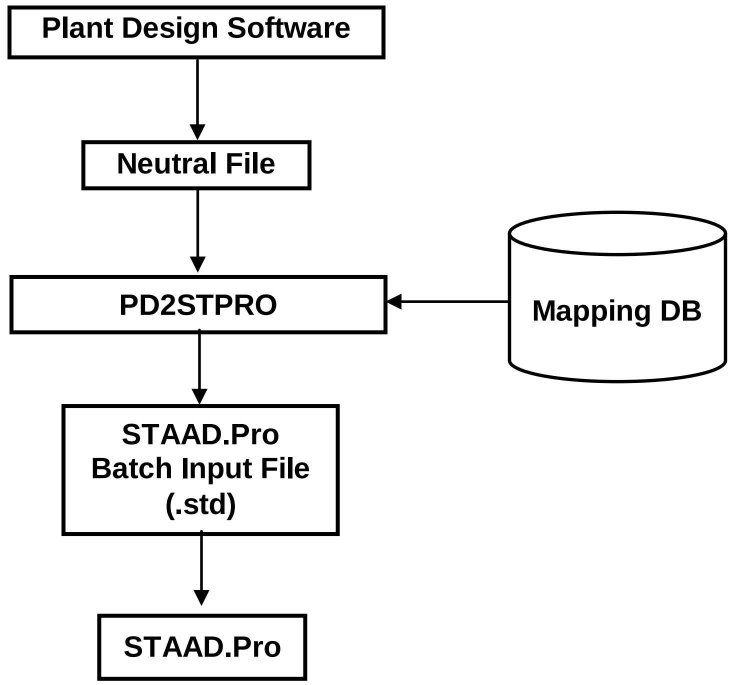


Figure 1-1

This manual describes the development done on Plant Design-to-STAAD.Pro Translator It is assumed that the user is already familiar with the principles of Plant Design Software Structural Application and the practices followed in Plant Design Structural catalogue and specifications. It is also assumed that the user has used Plant Design Software to generate structures by using available facilities in Plant Design Software and the user is familiar with STAAD.Pro. At this stage it is essential to know that Plant Design Software and STAAD.Pro use different world coordinate systems; so, it is recommended that the user checks the STAAD.Pro model before using the Plant Design-to-STAAD.Pro Translator.

1.1 How the Translator works?

1.1.1 The sections modeled in Plant Design Software are initially converted to an intermediate neutral file using the Neutral File Creation Program.

1.1.2 The windows executable PD2STPRO.exe reads this intermediate neutral file and maps it against the Material mapping DB and Section mapping DB to identify the valid STAAD.Pro section name that corresponds to the Plant Design software section Specification. This executable finally generates the batch input file (*.std), which can be opened and viewed in STAAD.Pro.

2.0 Installing the Program

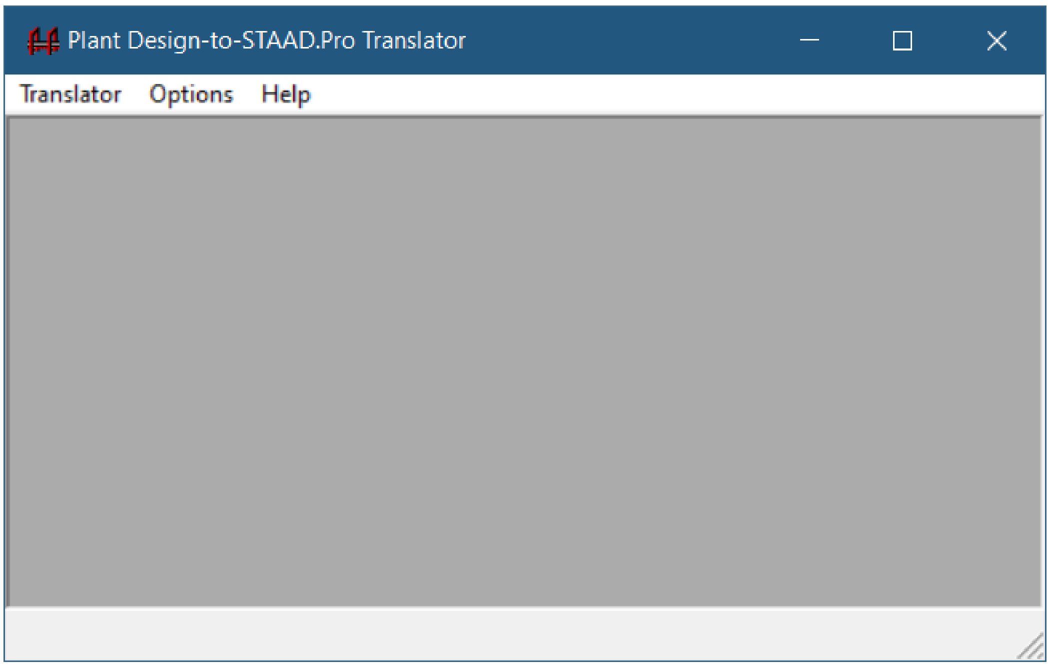
Refer Section 1 in SST License Manager User's Manual for details.

3.0 Limitations

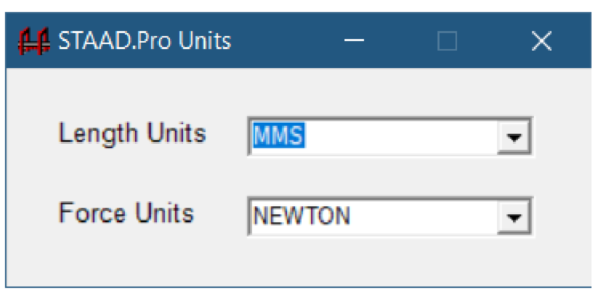
The present version of the Translator has certain limitations.

Please refer to the section titled "Limitations" in the corresponding product help file. For example, the limitations for the current version of the Translator from PDMS-to-STAAD.Pro are listed in Section 4.0 titled "Limitations" in the corresponding help file (PDMS.hlp).

4.0 Working Procedure



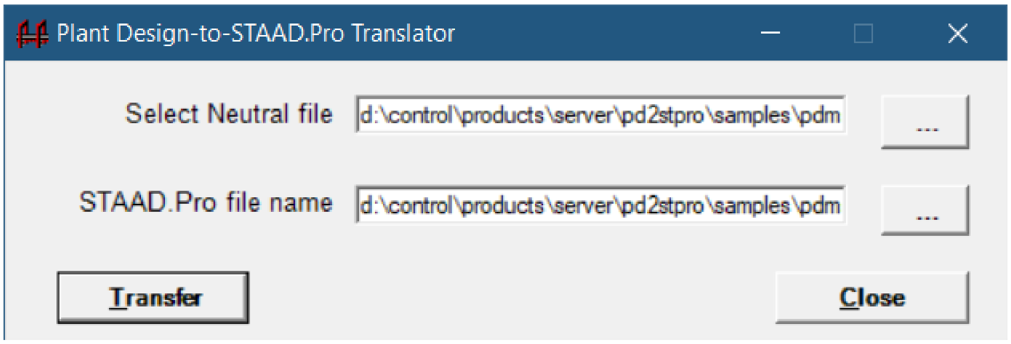
4.1 On launching the program the above form will appear.



4.2 Length Units and Force Units for the STAAD.Pro input file could be specified through "Options->Units". Refer the figure shown above.

4.3 Material information (Material Name) available in the Neutral File (extracted from Plant Design System) shall be used to obtain the Material properties from the Material Mapping DB (MarProp.mdb) built into this software. Translator uses the Material Name from the Neutral File and checks the Mapping DB with the field “Name”. If it finds the name matching the Material Name, then it extracts the information such as Poisson’s ratio, Young’s Modulus, etc., Incase, the material information corresponding to Plant Design Material Name is not available in the Material Database, then the translator uses the properties corresponding to the Default Material specified by the user. To specify the Default Material, click “Options->Default Material”. User can add more material properties to the existing DB to suit their requirements. Refer Appendix A for more details on adding the Material Property with the exiting DB.

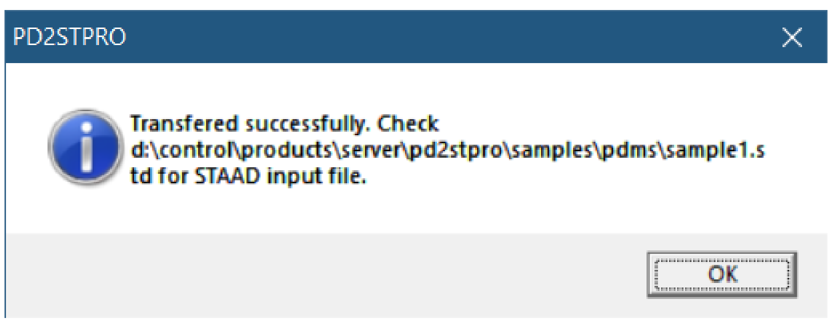
4.4 From the “Translator” menu, click “PD2STPRO”. A form will be displayed as shown below.



4.5 Selection of Neutral File can be done in two ways viz. by entering the name of the Neutral File along with the valid path in the text box provided or by navigating through the corresponding button. Refer “.hlp” for details on generating neutral file from Plant Design software.

4.6 Similarly, enter the name of the STAAD.Pro input file to be created as explained in Step 4.1.

4.7 Click the button “Transfer” to transfer model to STAAD.Pro format. Upon successful transfer, user gets the message box as shown below.



5.0 Validation of the translator

This section presents ten examples where Plant Design models have been created and transferred to STAAD.Pro to demonstrate different features of the translator. The Neutral file and the corresponding STAAD.Pro input file after conversion is included in the folder “PD2STPRO\Sample” of distribution package for reference. Some of the model thus transferred was then modified (loads added for analysis) for validation of the translator. These validation models are stored in the folder “PD2STPRO\Validation”. The details are listed below in this section.

Note: Some of the plant design software does not provide information about support condition and member release. For those softwares the user has to add the support conditions and member releases manually. To see the results, run the modified files using STAAD.Pro from “PD2STPRO\Validation” folder.

Sample 1

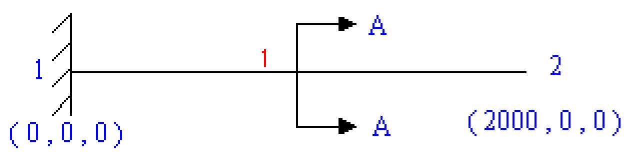
This model consists of a single cantilever beam. An angle section has been used.

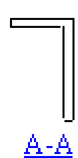
Section details

Member number	Profile Type	Material
1	L2.5X2X3/16 (AISC)	Not set

Node details

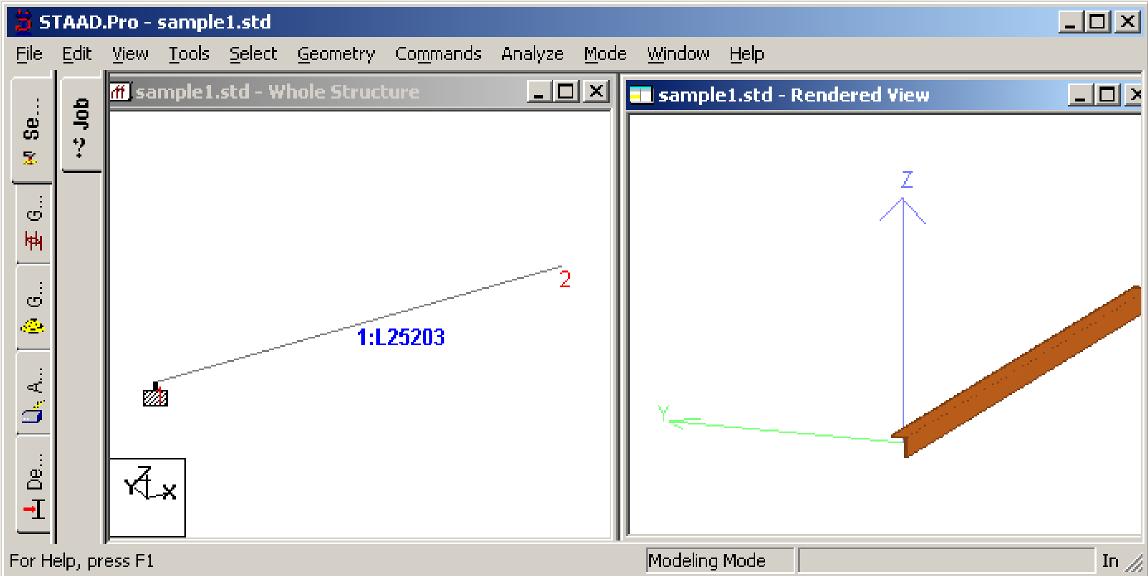
Node Number	External support
1	Fixed
2	Free





All dimensions are in mm

The pictorial representation of the model after transferring to STAAd.Pro is shown below.



To apply a load of 15 kN at node 2, the following lines have been added to the STAAD.Pro input file (sampl1.std).

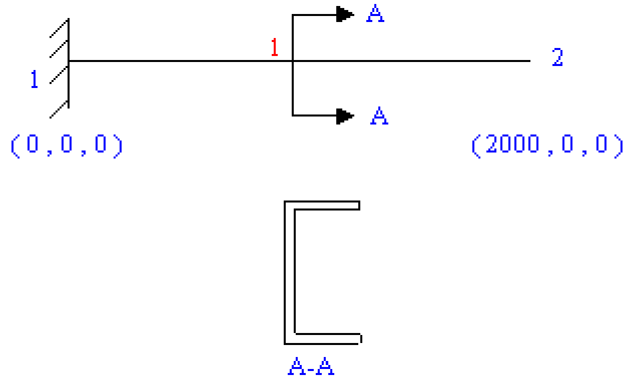
```
**********************************************************************
PRINT MEMBER INFORMATION LIST  1
PRINT MEMBER PROPERTY LIST  1
LOADING 1 DEAD AND LIVE LOAD
JOINT LOAD
2 FZ  -15000
PERFORM ANALYSIS
PRINT MEMBER FORCES
PRINT SUPPORT REACTION
PRINT JOINT DISPLACEMENT
**********************************************************************
```

Weight of the structure (Calculated from STAAD.Pro reactions) = 80.38 N

Weight of the structure (Hand calculated) = 80.18 N

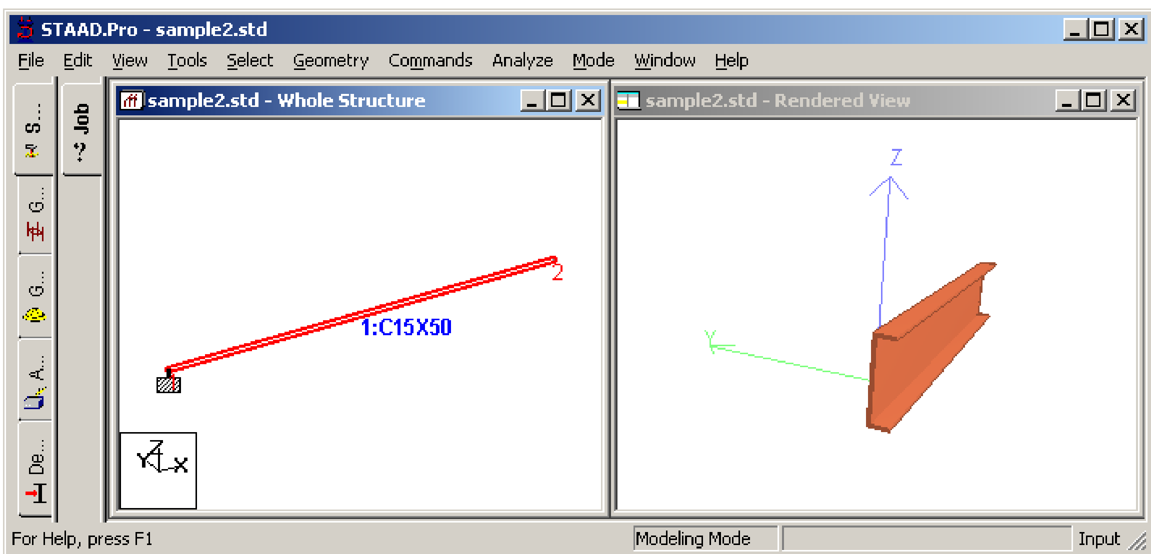
Sample 2

This model is same as sample1 except that a channel section (C15X50, American) is used instead of an angle section.



All dimensions are in mm

The pictorial representation of the sample in STAAD.Pro after transfer is shown below.



A load of 15 kN has been applied at the node 2 as in sample 1. The same commands (given in sample 1) can be used. To see the results, run the file “sample2_mod.std”.

Weight of the structure (Calculated from STAAD.Pro reactions) = 1457 N

Weight of the structure (Hand calculated) = 1456.9 N

Sample 3

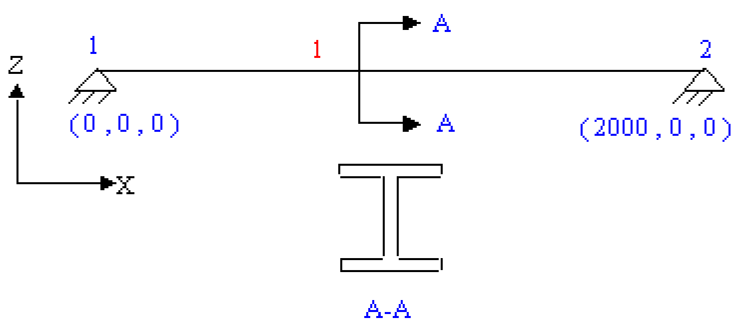
A simply supported beam consisting of an I-section.

Section details

Member number	Profile Type	Material
1	W18X50 (AISC)	Not set

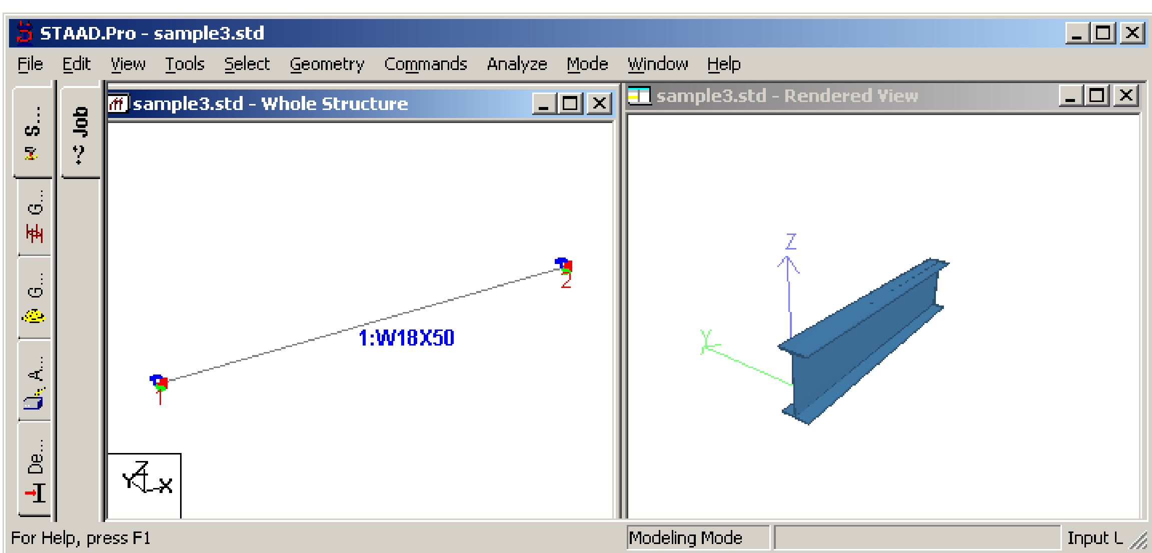
Node details

Node Number	External support
1	Fixed but MY
2	Fixed but MY



All dimension are in mm

The pictorial representation of the STAAD.Pro model after transfer is shown bellow.



The following lines have been added to the STAAD.Pro input file (sample3.std) to apply a concentrated load of 15 kN at the mid span of the beam. Run the file “sample3_mo.std” to see the results.

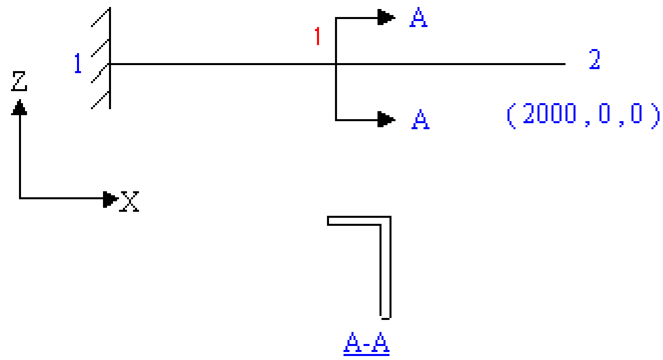
```
*****************************************************************
PRINT MEMBER INFORMATION LIST 1
PRINT MEMBER PROPERTIES LIST 1
LOAD 1 DEAD AND LIVE LOAD
SELFWEIGHT Z -1
MEMBER LOAD
1 CON GZ -15000 1000 0
PERFORM ANALYSIS
PRINT MEMBER FORCES
PRINT SUPPORT REACTION
PRINT JOINT DISPLACEMENTS
*****************************************************************
```

Weight of the structure (Calculated from STAAD.Pro reactions) = 1456.9 N

Weight of the structure (Hand calculated) = 1456.91 N

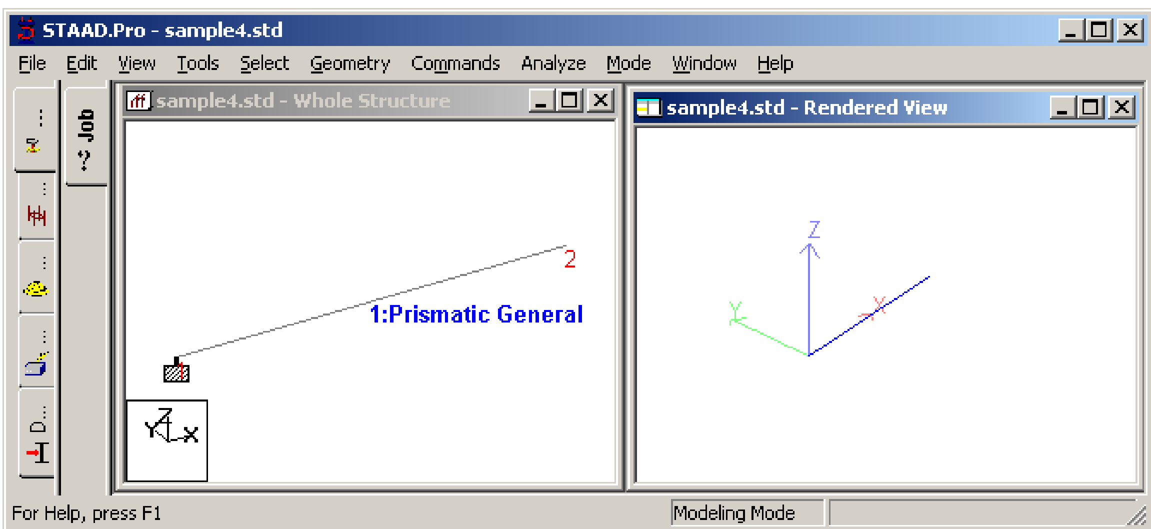
Sample 4

A single cantilever beam made up of Canadian profile CL100X75X8 which is not available in the section database provided with the software. Here the section has been transferred as a “GENERAL” section. The translator calculates the sectional properties.



All Dimensions are in mm

The pictorial representation of the STAAD.Pro model after transfer is shown bellow.



As in sample 1 15 kN has been applied at the node 2. The same can be seen in file sample4_mod.std

Weight of the structure (Calculated from STAAD.Pro reactions) = 256.55 N

Weight of the structure (Hand calculated) = 256.55 N

Sample 5

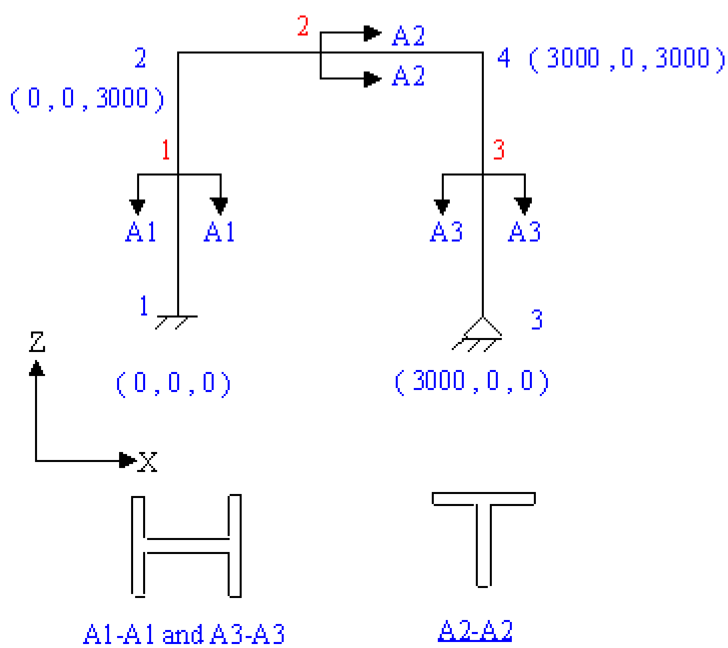
This is a single bay single storey.

Section details

Member number	**Profile Type**	**Material**
1, 3	W18X50 (AISC)	Not set
2	WT18X105 (AISC)	Not set

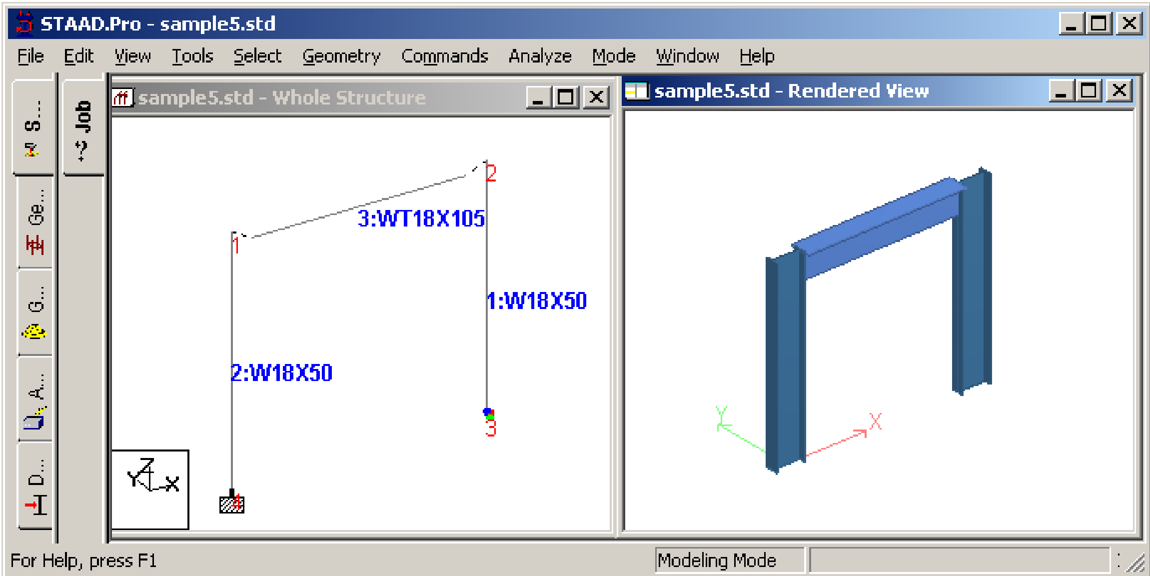
Node details

Node Number	**External support**
1	Fixed
3	Fixed but MY



All dimensions are in mm

The pictorial representation of the STAAD.Pro model after transfer is shown bellow.



The following block of commands has been added to apply a load of 10 kN at the mid span of the beam (see file “sample5_mod.std”).

****

LOAD 1 LOADTYPE None TITLE LOAD CASE 1

JOINT LOAD

2 FX 10000

PERFORM ANALYSIS

PRINT SUPPORT REACTION

PRINT MEMBER FORCES

PRINT JOINT DISPLACEMENTS

****

Weight of the structure (Calculated from STAAD.Pro reactions) = 8264.7 N

Weight of the structure (Hand calculated) = 8264.67 N

Sample 6

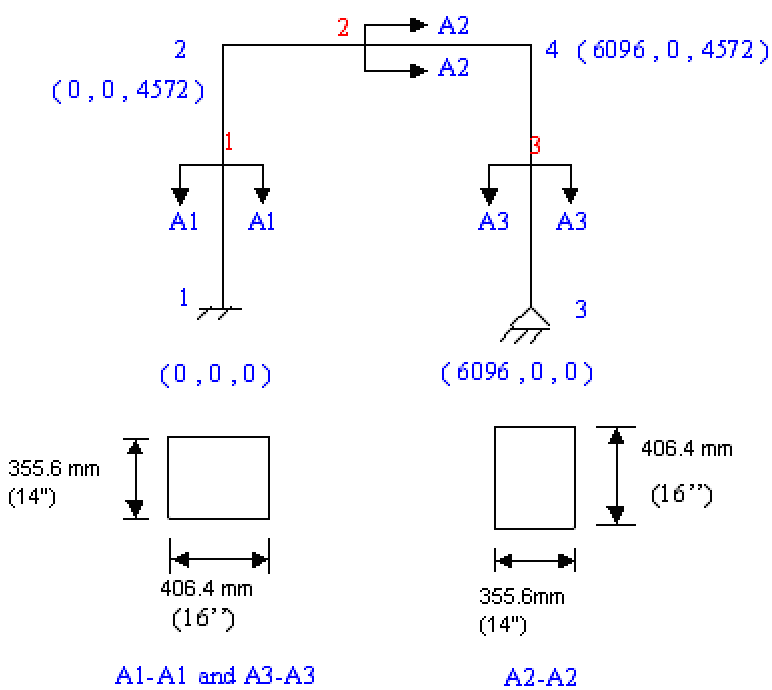
This model is a single bay single storey frame. The model was created in the Plant Design software using "mm" unit. While transferring "inches" and "kip" were selected from the option menu.

Section details

Member number	Profile Type	Dimension	Material
1, 2, 3	Rectangular	Depth = 16", Width = 14"	Concrete

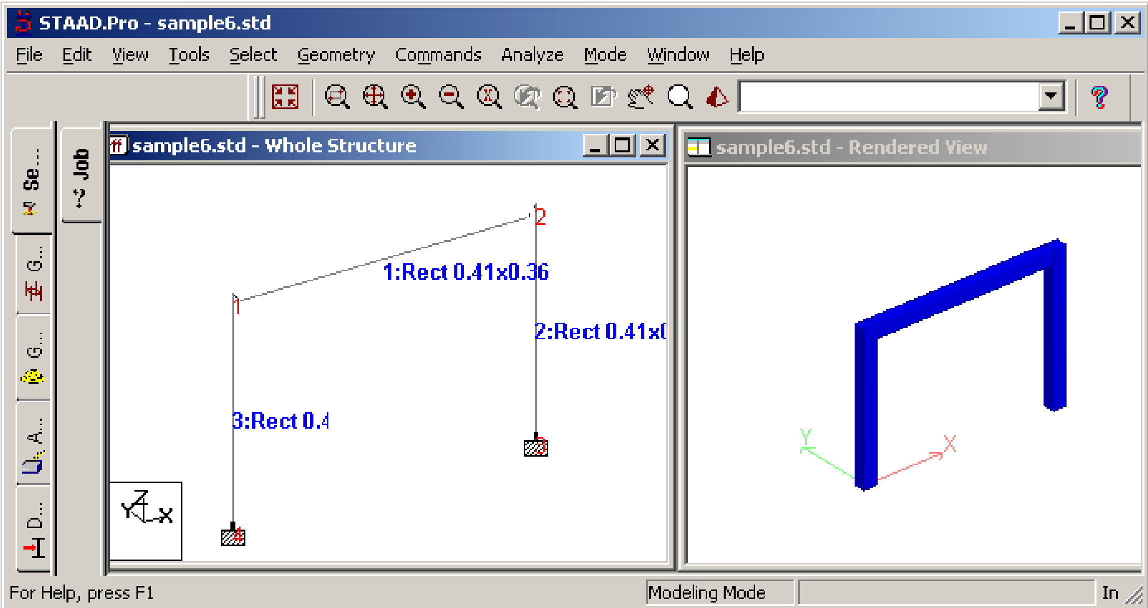
Node details

Node Number	External support
1	Fixed
3	Fixed but MY



All dimension are in mm

The pictorial representation of the STAAD.Pro input file after transfer is shown below.



For applying a load of 10kN at joint 2 in the global X-axis direction, the following lines were added to the file “sample6.std”. See the file “sample6_mod.std” for the modified file.

****

UNIT METER KN

LOAD 1 LOADTYPE None TITLE LOAD CASE 1

JOINT LOAD

2 FX 10000

PERFORM ANALYSIS

PRINT SUPPORT REACTION

PRINT MEMBER FORCES

PRINT JOINT DISPLACEMENTS

****

Weight of the structure (Calculated from STAAD.Pro reactions) = 50.68 N

Weight of the structure (Hand calculated) = 50.51 N

Sample 7

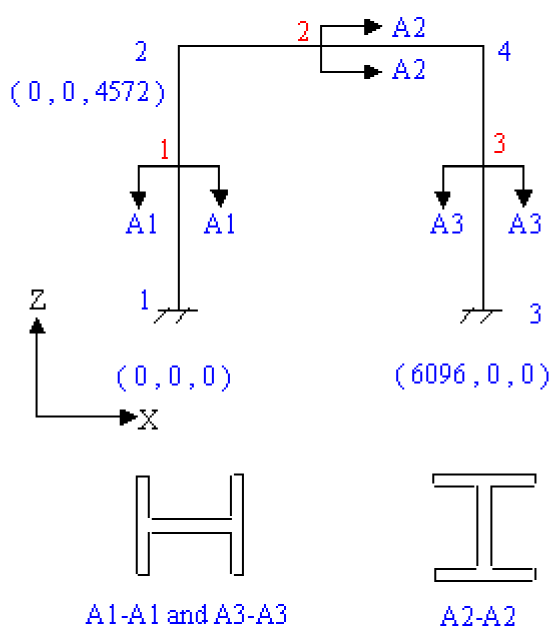
The model is a single bay single storey frame. The structure was modeled in "mm" unit in the Plant Design software and transferred , selecting the length unit "INCHES"

Section details

Member number	Profile Type	Member release	Material
1	W8x18(American)		Not set
2	W12X26(American)	MY at node 4	Not set
3	W8x18(American)	MY at node 4	Not set

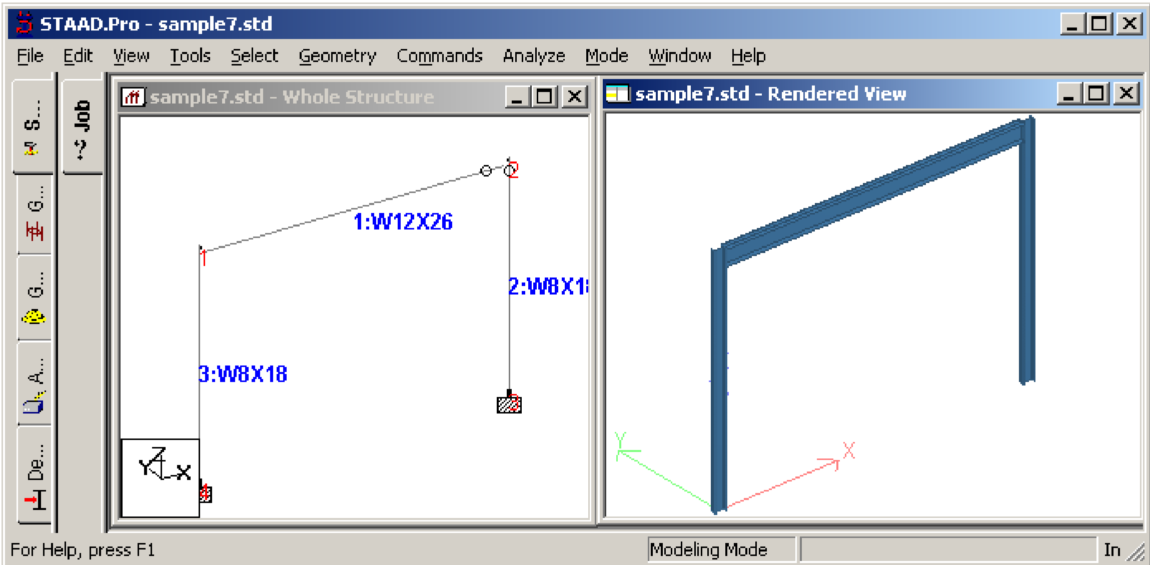
Node details

Node Number	External support
1	Fixed
3	Fixed



All dimensions are in mm

The pictorial representation of the STAAD.Pro input file after transfer is shown below.



In the modified file “sample7_mod.std” a load of 15 kN at the mid span of the beam and self-weight was applied. The following command block was added to “sample7.std”.

```
**********************************************************************
PRINT MEMBER INFORMATION LIST 1
PRINT MEMBER PROPERTIES LIST 1
LOAD 1 DEAD AND LIVE LOAD
SELFWEIGHT Z -1
UNIT INCHES NEWTON
MEMBER LOAD
1 CON GZ -15000 120 0
PERFORM ANALYSIS
PRINT MEMBER FORCES
PRINT SUPPORT REACTION
PRINT JOINT DISPLACEMENTS
**********************************************************************
```

Weight of the structure (Calculated from STAAD.Pro reactions) = 4.62 KN

Weight of the structure (Hand calculated) = 4.62 KN

Sample 8

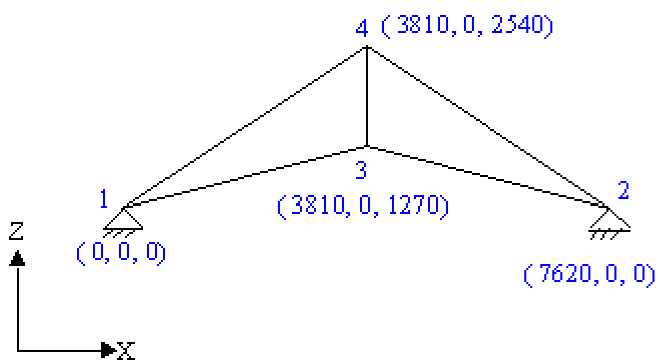
This model is a truss with pipe sections as member. While transferring the "INCHES" was chosen as the length unit.

Section details

Member number	Profile Type	Material
All	101.6X4.2TUBE (Japanese)	Not set

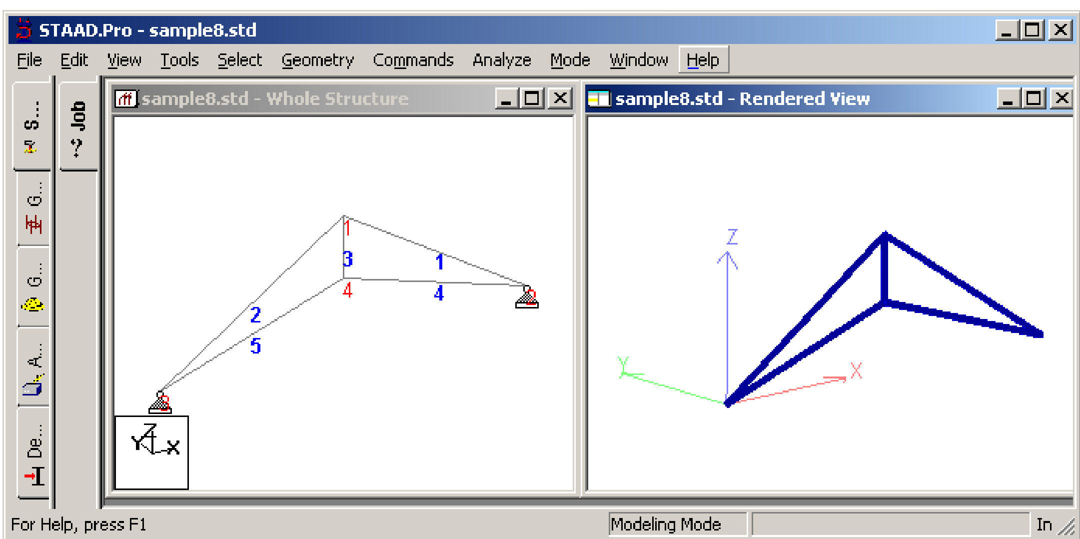
Node details

Node Number	External support
1, 2	Fixed but MY



All dimensions are in mm

The pictorial representation of the STAAD.Pro input file after transfer is shown below.



In the modified file a load of 10 kN was applied in the downward direction at the joint 4. The following block of command was added to the file “sample8.std”

****

UNIT INCHES NEWTON

PRINT MEMBER INFORMATION LIST 1

PRINT MEMBER PROPERTIES LIST 1

LOAD 1 DEAD AND LIVE LOAD

JOINT LOAD

1 FZ -15000

PERFORM ANALYSIS

PRINT MEMBER FORCES

PRINT SUPPORT REACTION

PRINT JOINT DISPLACEMENTS

****

Weight of the structure (Calculated from STAAD.Pro reactions) = 1821.36 N

Weight of the structure (Hand calculated) = 1821.36 KN

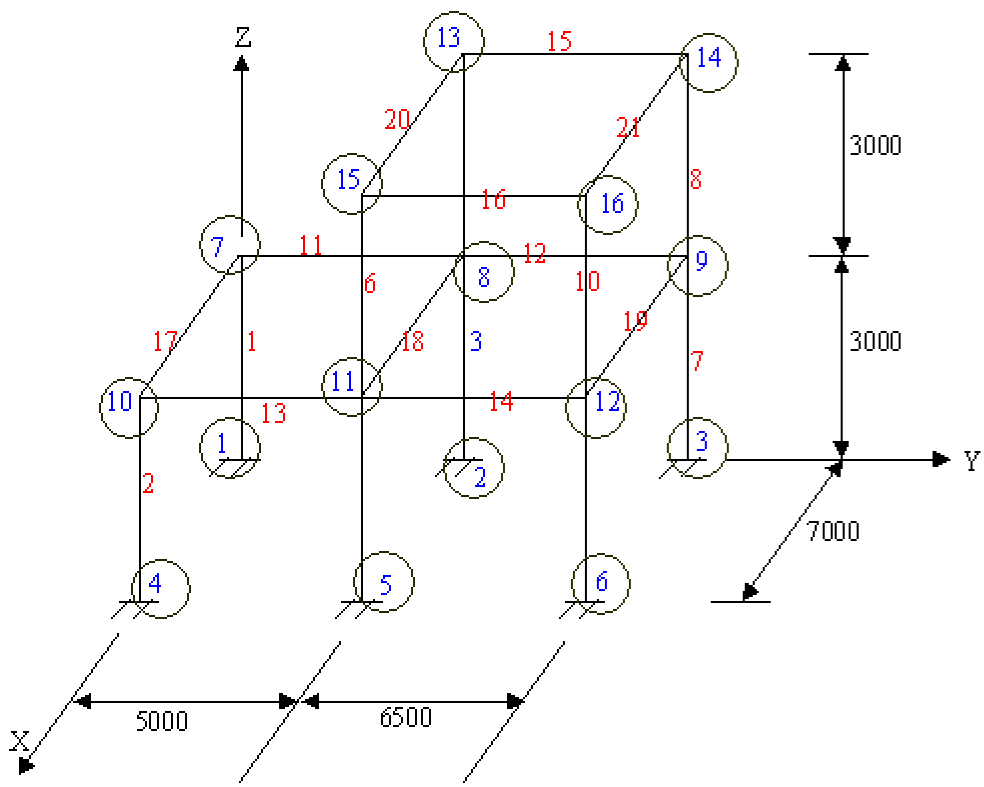
Sample 9

Section details

Member number	Profile Type	Dimension	Material
1 and 2	Circular	Diameter = 300 mm	Concrete
3 to 10	Square	300mmX300mm	Concrete
11 to 21	Rectangular	533mmX406mm	Concrete

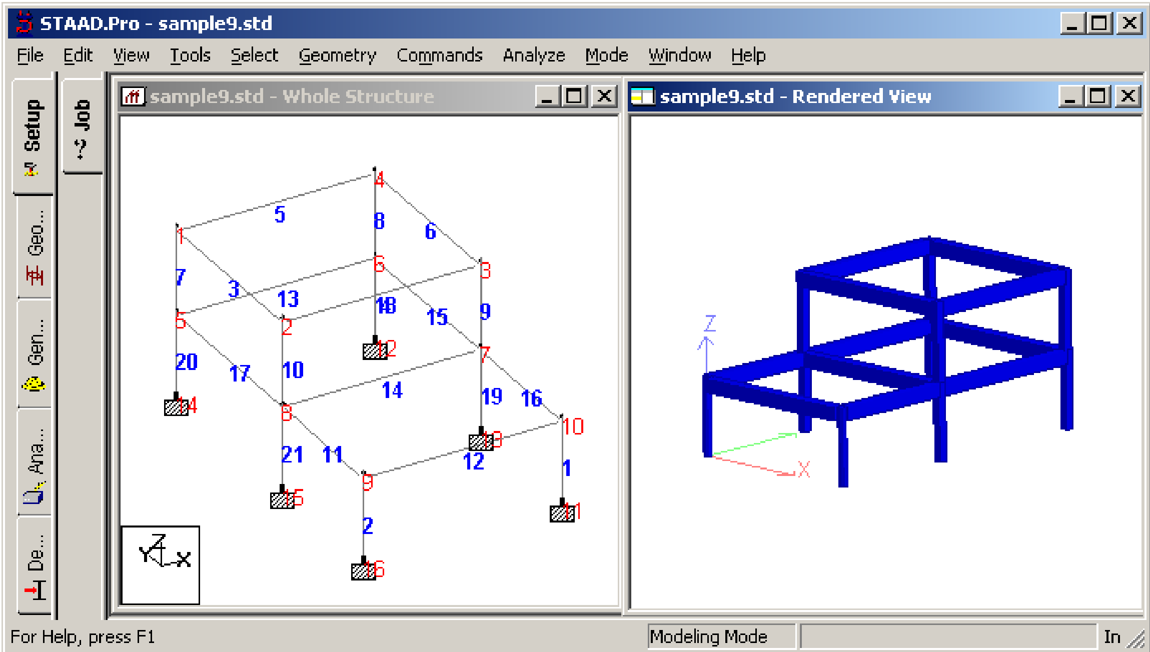
Node details

Node Number	External support
1 to 6	Fixed



All dimensions are in mm

The pictorial representation of the STAAD.Pro input file after transfer is shown below.



In the modified file (sample9_mod.std) self-weight was added as load. The corresponding block of command is given below.

****

PRINT MEMBER INFORMATION LIST 1

PRINT MEMBER PROPERTIES LIST 1

LOAD 1 DEAD AND LIVE LOAD

SELFWEIGHT Z -1

PERFORM ANALYSIS

PRINT MEMBER FORCES

PRINT SUPPORT REACTION

PRINT JOINT DISPLACEMENTS

****

Weight of the structure (Calculated from STAAD.Pro reactions) = 406.8 KN

Weight of the structure (Hand calculated) = 405.3 KN

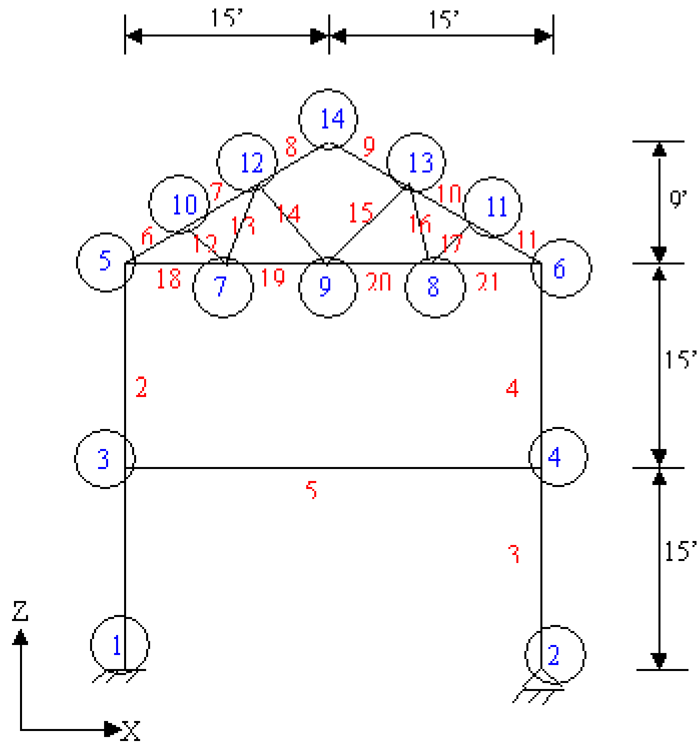
Sample 10

Section Details

Member Number	Profile Type	Member type
1 to 11	W8X40 (AISC)	
12 to 16	CL8X4X1 (AISC)	Truss member
18 to 21	W8X40 (AISC)	Truss member

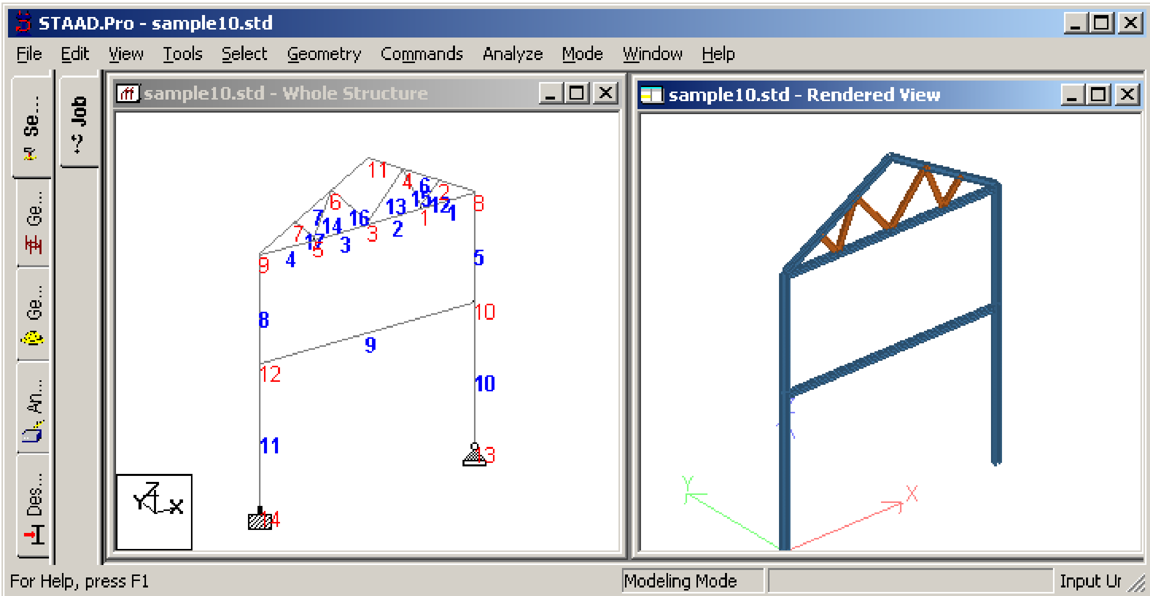
Node details

Node Number	External support
1	Fixed
2	Fixed but MY



All dimensions are in mm

The pictorial representation of the STAAD.Pro input file after transfer is shown below.



In the modified file “sample10_mod.std” a load of 15 kN has been applied at joint 13. The corresponding block of command is given below.

****

PRINT MEMBER INFORMATION LIST 1

PRINT MEMBER PROPERTIES LIST 1

LOAD 1 DEAD AND LIVE LOAD

JOINT LOAD

11 FZ -15000

PERFORM ANALYSIS

PRINT MEMBER FORCES

PRINT SUPPORT REACTION

PRINT JOINT DISPLACEMENTS

****

Appendix A

Material Mapping DB

This release of Plant Design -to-STAAD.Pro assigns values for material properties as given below while transferring structure model from Plant Design Software to STAAD.Pro

The Plant Design-to-STAAD.Pro program reads the material name from the neutral file extracted from the plant design software and gets the material properties from the material DB (MatProp.mdb) corresponding to the plant design material name. If the material name is not found in the material DB, then the default material is assigned to the section element in STAAD.Pro. The user can also specify /select the default material from the available materials from the material DB through "Options->Default Material" before conversion. If the user doesn't select any default material, then the first material name shown in the combo box when the user selects "Default material" though "Option" menu shall be used as default material.

User is allowed to create and add his/her own material to the existing Mapping DB (MatProp.mdb. Microsoft Access or other compatible software can be used for editing the DB) supplied along with this software. This db contains a table with name "Material" and contains six fields viz. Name, E, Poisson, Density, Thermal and Damping. The first field "Name" contains the name of the material. The Second field "E" contains the Young's modulus of elasticity of the material , the third field "Poisson" defines the Poisson's ratio of the material, the fourth field "Density" defines the density of the material, the fifth field "Thermal" defines the co-efficient of thermal expansion for the material and the sixth field "Damping" defines the co-efficient of Damping to be used in the dynamic analysis for that material. Please note, the Material DB must exist before it is used in the Code Mapping DB.

Adding User Material to the existing Material DB

a. Write the material name in the Name field. The name should not contain any space or hyphen ("-") character.

b. Similarly enter the value of Young's modulus in the second field, Poisson's ratio in the third field, density in the fourth field, co-efficient of thermal expansion and contraction in the fifth field and co-efficient of damping in the sixth field.

Field Name	Unit
Name	No unit
E	KN / m^2
Poisson	No unit
Density	KN / M^3
Thermal	/ Degree Kelvin
Damping	No unit

Sample Material Table in MatProp.mdb DB

Name	E	Poisson	Density	Thermal	Damping
ALUMINUM	6.89E+07	0.33	26.6	2.30E-05	0.05
CONCRETE	2.17E+07	0.17	23.56	1.00E-05	0.03
STEEL	2.05E+08	0.3	76.81	1.20E-05	0.03

Appendix B

Plant Design-to-STAAD.Pro Section Mapping

The Plant Design-to-STAAD.Pro neutral file has the provision to store the section properties, catalogue reference and specification reference. The program will automatically extract these properties and write them in the neutral file, if it is available in the Plant Design Software.

During the conversion, the program first reads the catalogue reference and specification reference from the neutral file and then compares these with the Standard Section mapping db (StandardSection.mdb). If found, then it uses the information specified in the mapping DB for conversion to STAAD.Pro.

If the same is not found in the Standard Section mapping DB, then the program compares the catalogue reference and the specification reference with the user defined section-mapping db (UserdefinedSection.mdb). If found, then the program uses the information specified in the mapping DB for conversion to STAAD.Pro.

Lastly, the program tries to get the section properties directly from the neutral file and transfers it to STAAD.Pro, if it is available.

Please note, If these properties are not defined in the Plant Design as well as in both mapping DB, then the user might see an error message from STAAD.Pro.

The details on mapping sections are described below.

For mapping sections from Plant Design software to STAAD.Pro two mapping DBs are provided namely StandardSection.mdb and UserdefinedSection.mdb as specified above.

StandardSection.mdb contains tables which are named after specific standards e.g. The table named “American” represents the AISC standard, the table named “British” represents British standard so on and so forth. Each table contains four fields viz. “PDNAME”, “SPREF”,” STAADNAME” and “TANALPHA”. As the names suggest PDNAME contains the name of the section in the Catalogue of PDMS, SPREF contains the specification reference name in Plant Design software; STAADNAME is the corresponding name of the section in STAAD.pro. While mapping a section from Plant Design to STAAD.Pro, the Specification reference is used. If the Specification reference is not found then the Catalogue reference (PDNAME) is used. If the user wants to use only PDNAME for mapping, then the filed SPREF shall be left unfilled. TANALPHA is the arctan of the angle (***tan*** α) between the principal Axis system for second moment of area and local y-z axis system of the section. For more details about angle α refer Appendix - C .

Sample Table in StandardSection.mdb

PDNAME	SPREF	STAADNAME	TANALPHA
L8x8x5/8thk		L808010	1
L8x8x7/8thk		L808014	1
cL2.5x2x1/4thk		L25204	0.626
cL2.5x2x3/16thk		L25203	0.631
cL2.5x2x3/8thk		L25206	0.614
cL2.5x2x5/16thk		L25205	0.62
cL3.5x2.5x1/4thk		L35254	0.506

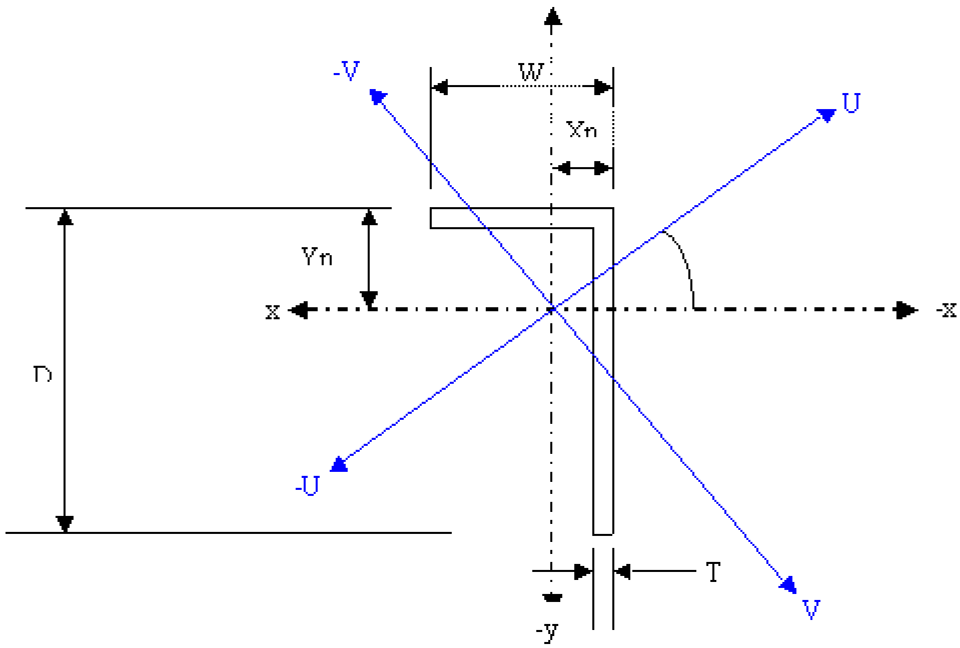
UserDefinedSection.mdb contains nine tables. Each table represents a generic section. The sections, which belong to a standard for which corresponding table is not available in the StandardSection.mdb can be mapped through UserdefinedSection.mdb. The fields for each table are different except three fields.

“PDNAME”, “SPREF” and “STANDARD” field is present in all the nine tables. The field “PDNAME” should contain the catalogue name of the section in PDMS and “SPREF” should contain the specification reference name of the section. Unlike the StandardSection.mdb , the user is not allowed to add tables in UserdefinedSection.mdb. If there is any section that does not match with any section profile it can be mapped through the GeneralSection table.

The GeneralSection table contains fields named Ax, Ay, Az, Ix, Iy, Iz, YD and ZD. Ax is the sectional area in the z-axis (Local z-axis in PDMS) direction, Ay is the shear area of the section in the x-axis(Local x-axis in PDMS) direction and Az is the shear area in the y-axis (Local y-axis in PDMS) direction. Similarly Ix, Iy and Iz are the second moment of area of the section along local z, x and y-axis (local axis in PDMS)respectively. YD and ZD are the distance of extreme fibre in local x-axis(Local x-axis in PDMS) and local y-axis(Local y-axis in PDMS) respectively.The dissimilarity between the property name and axis direction is due to the fact that PDMS and STAAD.Pro use different local axis convention for different section profile. Refer Appendix- B in PDMS manual for details about PDMS local axis convention.

Appendix C

Angle section



Note

All axes shown in the figure are local axes of the section

+U-axis is +z axis in STAAD

+V-axis is +y axis in STAAD

x-axis is the axis parallel to the short leg and passing through neutral axis.

y-axis is the axis parallel to the long leg and passing through neutral axis.

$$A_F = W \times T$$

$$A_W = (D - T) \times T$$

$$X_n = \frac{(A_F \times W/2 + A_W \times T/2)}{A_F + A_W}$$

$$Y_n = \frac{(A_F \times T/2 + A_W \times (D+T)/2)}{(A_F + A_W)}$$

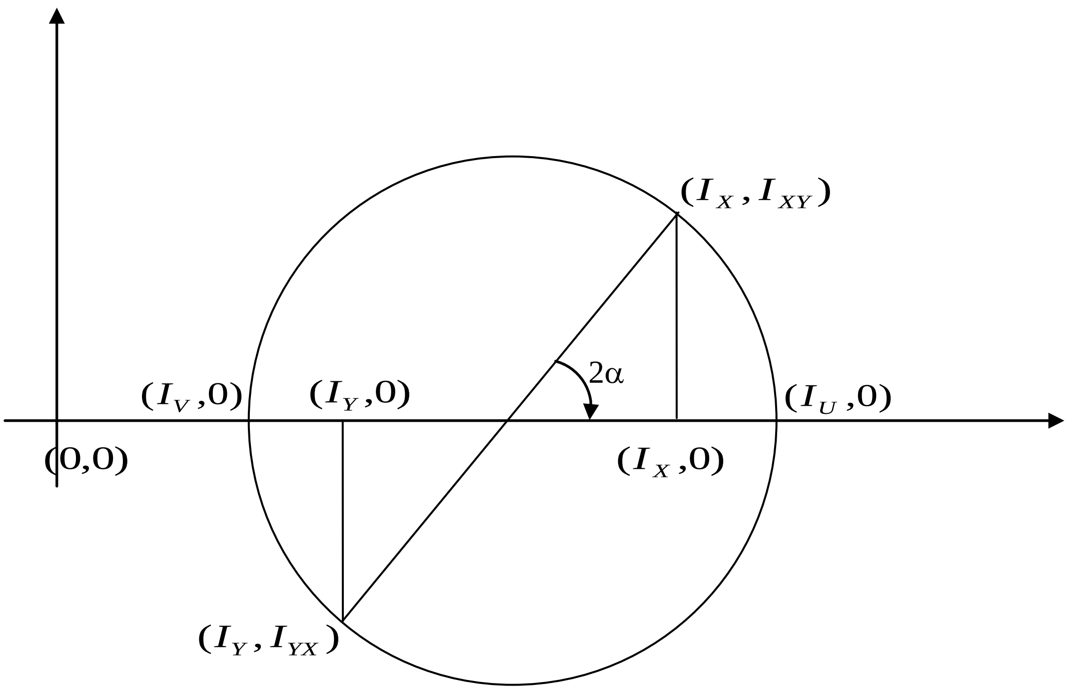
$$I_X = \frac{W \times T^3}{12} + A_F \times (Y_n - T/2)^2 + \frac{T \times (D-T)^3}{12} + A_W \times \left(\frac{D+T}{2} - Y_n\right)^2$$

$$I_Y = \frac{T \times W^3}{12} + A_F \times \left(\frac{W}{2} - X_n\right)^2 + \frac{(D-T) \times T^3}{12} + A_W \times \left(\frac{T}{2} - X_n\right)^2$$

$$I_X = \frac{W \times T^3}{3} + \frac{(D-T) \times T^3}{3}$$

$$I_{XY} = A_F \times \left(X_n - \frac{W}{2}\right) \times \left(Y_n - \frac{T}{2}\right) + A_W \times \left(X_n - \frac{T}{2}\right) \times \left(Y_n - \frac{D+T}{2}\right)$$

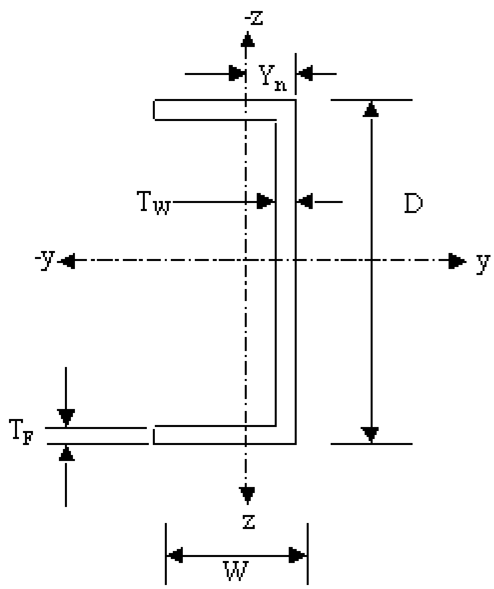
The angle α is then calculated using the Mohr's circle.



$$R = \sqrt{\left(\frac{I_X - I_Y}{2}\right)^2 + I_{XY}^2} \quad , \quad I_U = \frac{I_X + I_Y}{2} + R \quad , \quad I_V = \frac{I_X + I_Y}{2} - R \quad ,$$

$$\alpha = \frac{1}{2} \tan^{-1}\left(\frac{2I_{XY}}{I_X - I_Y}\right)$$

Channel Section



Note
For channel, -ve y direction in the figure
Is +ve z in STAAD.Pro and –ve x is the
+ve y (When global Z is up)

$$A_F = 2\times\left(T_F \times W\right) \quad , \qquad Y_n = \frac{A_F \times \dfrac{W}{2} + A_W \times \dfrac{T_W}{2}}{A_F + A_w}$$

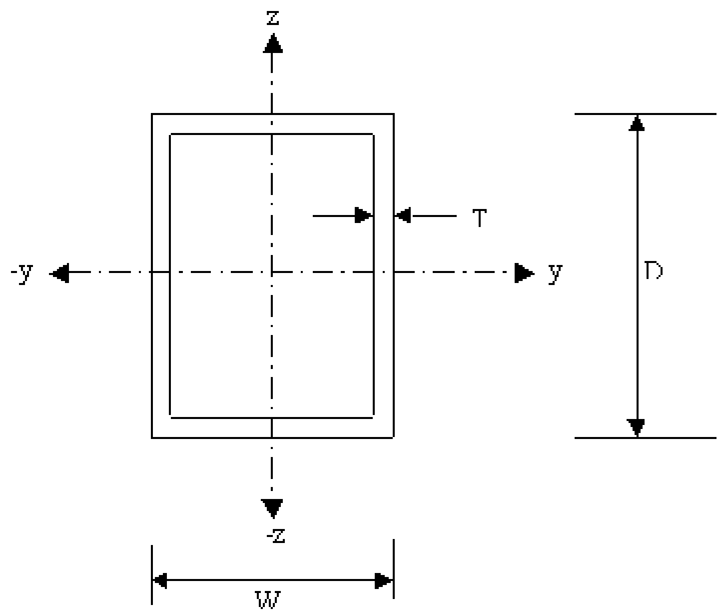
$$A_W = 2\times\left(D - 2\times T_F\right)$$

$$I_Y = 2\times\left(\frac{W \times T_F^3}{12}\right) + \frac{A_F \times \left(D - T_F\right)^2}{4} + \frac{T_W \times \left(D - 2\times T_F\right)^3}{12}$$

$$I_Z = \frac{T_F \times W^3}{6} + A_F \times \left(\frac{W}{2} - Y_n\right)^2 + \frac{\left(D - 2\times T_F\right)\times T_W^3}{12} + A_W\left(Y_n - \frac{T_W}{2}\right)^2$$

$$I_X = 2\times\frac{W \times T_F^3}{3} + \frac{\left(D - 2T_F\right)\times T_W^3}{3}$$

Box Section



$$A_X = 2\times\left[(D\times T)+(D-T)\times T\right] \quad , \quad A_Y = 2\times(W\times T)$$

$$A_Z = 2\times(D\times T)$$

$$I_Y = 2\times\left[\frac{W\times T^3}{12} + W\times T\left(\frac{D-T}{2}\right)^2 + \frac{(D-2T)^2\times T}{12}\right]$$

$$I_Z = 2\times\left[\frac{T\times W^3}{12} + \left\{\frac{(D-2T)\times T^3}{12} + \frac{(D-2T)\times T}{2}\times\left(\frac{W-T}{2}\right)^2\right\}\right]$$

$$I_X = I_Y + I_Z$$

Appendix D

Error messages

"Enter all the necessary data and proceed."

Description : Either the textbox for neutral file(*.scf) or STAAD.Pro input file(*.std) or both is not filled.

"Neutral File does not exist."

Description: The neutral file name filled in the textbox for neutral file does not exist.

"Invalid path for STAAD.Pro file."

Description: The path filled in the textbox for STAAD.Pro input file is not valid.

"Cannot determine product."

Description: The neutral file is not created by Plant Design-to-STAAD.Pro Translator.

“Wrong Neutral file format”

Description: Not a valid Plant Design-to-STAAD.Pro Neutral File.

"Server not found. SSTLM Service is not running in Server or COMPUTER_NAME in SSTLM Environmental variable is wrong."

Description: Server for the STAAD.Pro not specified. Refer, security.pdf and Install.hlp files for more details on specifying environmental variable “SSTLM”.

"Data missing from the Neutral File."

Description: The neutral file might have been altered.

Appendix D

STAAD.Pro anomaly

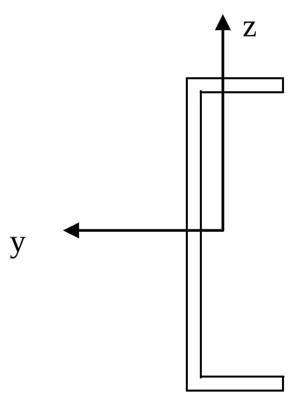
To orient the section members in space STAAD.Pro uses the concept of β (beta) angle. The definition of the β angle is stated below as given in STAAD.Pro (2004) manual. It should be noted that the set of rules given below are applicable when global Z-axis direction is set “UP” in STAAD.Pro.

> *When the local x-axis is parallel to the global Y-axis, as in the case of a column in a structure, the beta angle is the angle through which the local z-axis has been rotated about the local x-axis from a position of being parallel and in the same positive direction of the global Z-axis.*
>
> *When the local x-axis is not parallel to the global Y-axis, the beta angle is the angle through which the local coordinate system has been rotated about the local x-axis from a position of having the local z-axis parallel to the global X-Z plane and the local y-axis in the same positive direction as the global Y-axis.*

However it is noticed that there are certain section profiles and directions for which the rendered view in STAAD.Pro does not conform to the rules stated above. Two examples are given below to illustrate the problem.

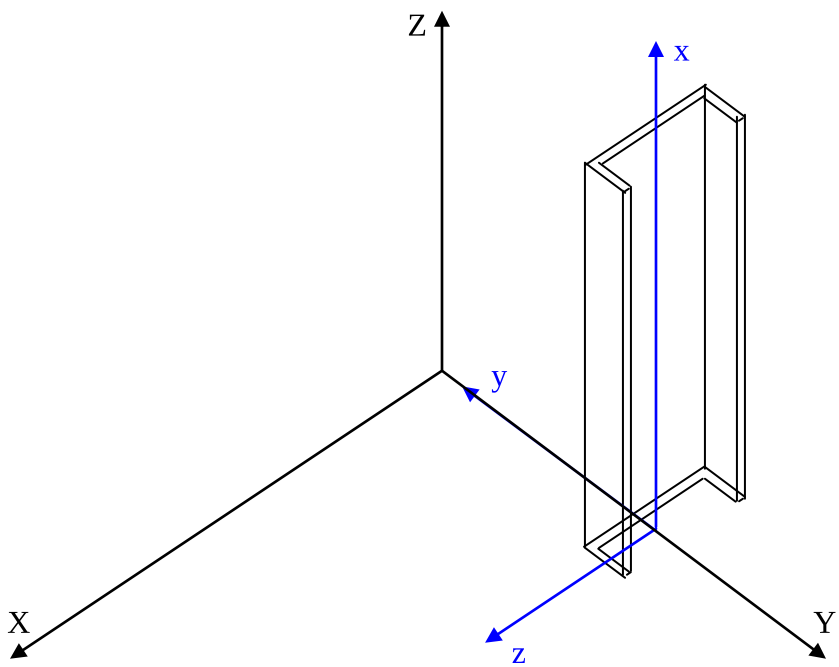
Example 1

The figure shown below shows the STAAD.Pro’s local axis convention for a channel section when global Z-axis is set “UP”.



Channel – ST
(Local x-axis goes into the page)

The figure below shows the positioning of the channel section in STAAD.Pro when the local x-axis of the channel section is parallel to the global Z-axis.



As the local x-axis of the section is not parallel to the global Y-axis the 2nd part of the definition stated in the previous page will hold good. So for $\beta = 0$ according to the definition the local y-axis should be in the same direction as the global Y-axis direction, but as the figure above suggests the local y-axis is pointing towards the opposite direction of global Y-axis.

The STAAD.Pro commands for the input file for the above problem are given below.

STAAD.Pro Commands for the input file

```
****************************************************************************************************STAAD SPACE

START JOB INFORMATION

ENGINEER DATE 07-Jun-06

END JOB INFORMATION

INPUT WIDTH 79

SET Z UP
```

UNIT METER KN

JOINT COORDINATES

1 0 0.5 0; 2 0 0.5 4;

MEMBER INCIDENCES

1 1 2;

DEFINE MATERIAL START

ISOTROPIC STEEL

E 2.05e+008

POISSON 0.3

DENSITY 76.8195

ALPHA 1.2e-005

DAMP 0.03

END DEFINE MATERIAL

MEMBER PROPERTY AMERICAN

1 TABLE ST C8X11

CONSTANTS

MATERIAL STEEL MEMB 1

FINISH

****

The example given above is not a singular case where STAAD.Pro graphical view errs. It is found that the error is noticeable for unsymmetrical sections like channel, and angle section. Given below is another example for the user's interest.

Example 2

STAAD.Pro Commands for the input file

****

STAAD SPACE

START JOB INFORMATION

ENGINEER DATE 07-Jun-06

END JOB INFORMATION

INPUT WIDTH 79

SET Z UP

UNIT METER KN

JOINT COORDINATES

1 0 0 0.5; 2 4 0 0.5;

```
MEMBER INCIDENCES
1 1 2;
DEFINE MATERIAL START
ISOTROPIC STEEL
E 2.05e+008
POISSON 0.3
DENSITY 76.8195
ALPHA 1.2e-005
DAMP 0.03
END DEFINE MATERIAL
MEMBER PROPERTY AMERICAN
1 TABLE ST C8X11
CONSTANTS
MATERIAL STEEL MEMB 1
FINISH
**********************************************************************************************
```