

Manual

SYS Design Kit

DISCLAIMER

CONSIDERABLE TIME, EFFORT AND EXPENSE HAVE GONE INTO THE DEVELOPMENT AND DOCUMENTATION OF SYS DESIGN KIT PROGRAM. THE PROGRAM HAS BEEN THOROUGHLY TESTED AND USED. IN USING THE PROGRAM, HOWEVER, THE USER ACCEPTS AND UNDERSTANDS THAT NO WARRANTY IS EXPRESSED OR IMPLIED BY THE DEVELOPERS OR THE DISTRIBUTORS ON THE ACCURACY OR THE RELIABILITY OF THE PROGRAM.

THE USER MUST EXPLICITLY UNDERSTAND THE ASSUMPTIONS OF THE PROGRAM AND MUST INDEPENDENTLY VERIFICATION THE RESULTS

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Introduction

Introduction

SYS Design Kit is a design software for steel structure. The software is able to design truss structure, frame structure and floor structure. There are five modules namely, Lattice Truss Design, Howe Truss Design, Arch Truss Design, Frame Design and Floor Design. All modules are written in the same environment and interactively interface with users.

The software uses windows platform. Users can easily control the program by the command buttons as shown.

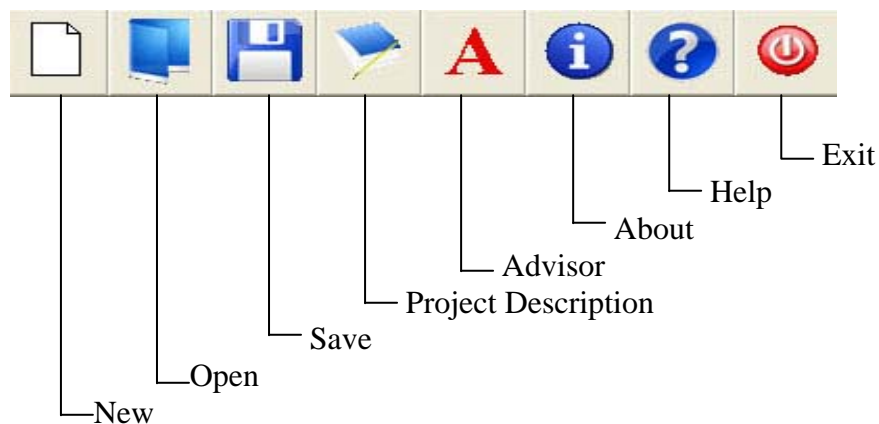
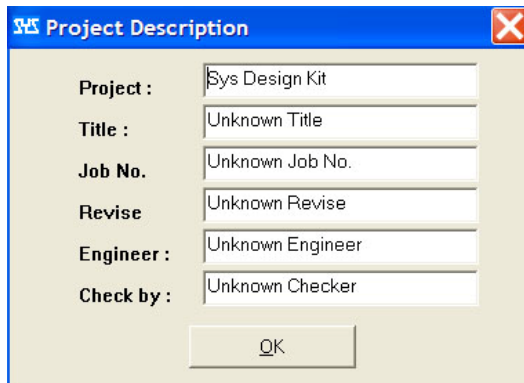


Figure 1. Control Buttons

Control Buttons

- 1. New File Button**
To be used for creating the new file.
- 2. Open File Button**
To be used for opening the existing file in the database.
- 3. Save File Button**
To be used for saving the file onto hard disk or floppy disk or removable disk.
- 4. Project Description Button**
To be used for showing user information about the project e.g. project name, job title, job no., engineer. The relevant information of Design task can be input as the reference.



Project Description

Project : Sys Design Kit

Title : Unknown Title

Job No. : Unknown Job No.

Revise : Unknown Revise

Engineer : Unknown Engineer

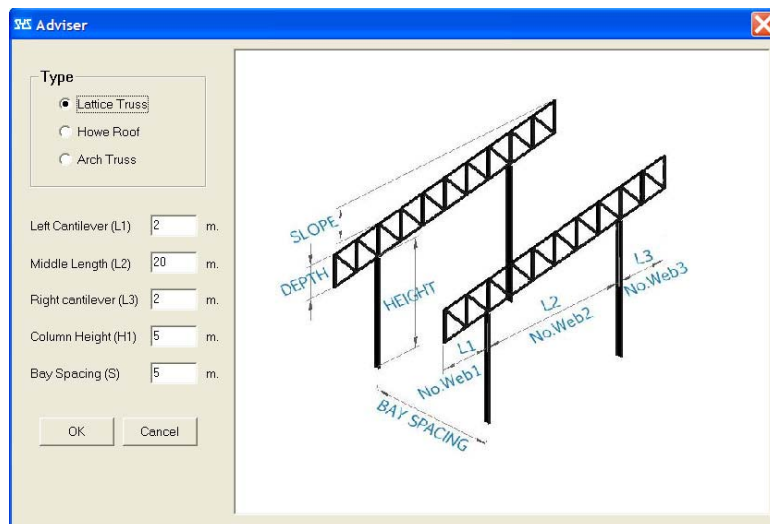
Check by : Unknown Checker

OK

Figure 2. Project Description

5. Advisor Button

To be used for helping user to create truss geometry: lattice truss, howe truss and howe truss.



Advisor

Type

☒ Lattice Truss

☐ Howe Roof

☐ Arch Truss

Left Cantilever (L1) : 2 m.

Middle Length (L2) : 20 m.

Right cantilever (L3) : 2 m.

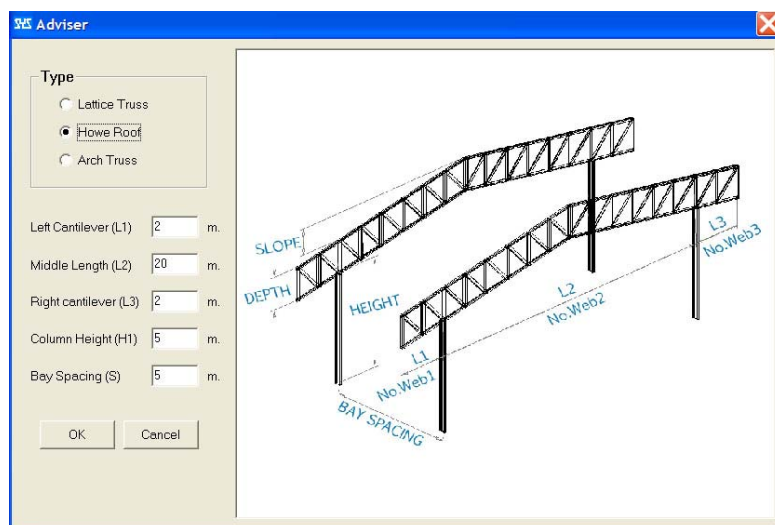
Column Height (H1) : 5 m.

Bay Spacing (S) : 5 m.

OK Cancel

Diagram labels: SLOPE, DEPTH, HEIGHT, L1, L2, L3, No.Web1, No.Web2, No.Web3, BAY SPACING

Figure 3. Advisor for Lattice Truss



Advisor

Type

☐ Lattice Truss

☒ Howe Roof

☐ Arch Truss

Left Cantilever (L1) : 2 m.

Middle Length (L2) : 20 m.

Right cantilever (L3) : 2 m.

Column Height (H1) : 5 m.

Bay Spacing (S) : 5 m.

OK Cancel

Diagram labels: SLOPE, DEPTH, HEIGHT, L1, L2, L3, No.Web1, No.Web2, No.Web3, BAY SPACING

Figure 4. Advisor for Howe Truss

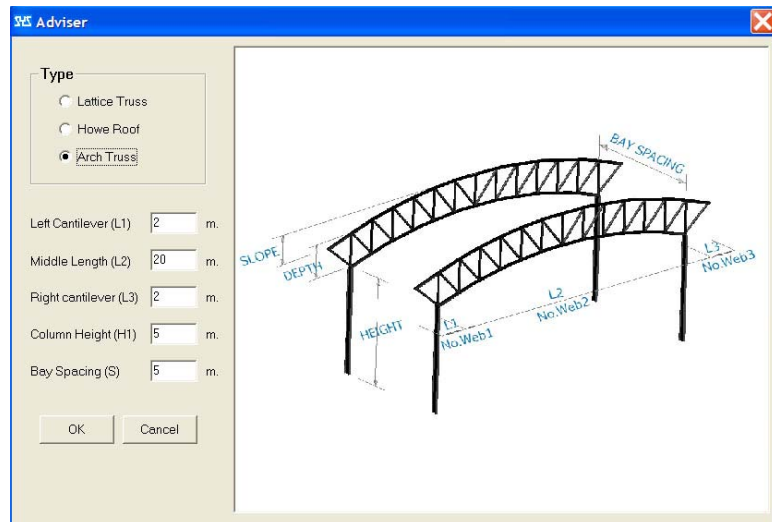


Figure 5. Advisor for Arch Truss

6. About Button

Containing program information such as, a version of the program is now being used.

7. Help Button

To be used for going to user's manual.

8. Exit Button

To be used for exiting the program.

System Requirement

CD-ROM drive (for installation)

Microsoft Windows 98 (original and Second Edition), Windows Millennium Edition (ME), Windows NT 4.0 (with Service Pack 5 for Y2K compliancy or Service Pack 6a), Windows 2000 (Service Packs 1 or 2), or Windows XP

Pentium, Pentium Pro, Pentium II, Pentium III, Pentium IV, Xeon or AMD Athlon, Athlon XP based personal computer

64 MB RAM minimum, 128 MB RAM recommended

Disk space varies depending on size of partition and installation

8-bit graphics adapter and display

Design Module 1: Steel Truss Design

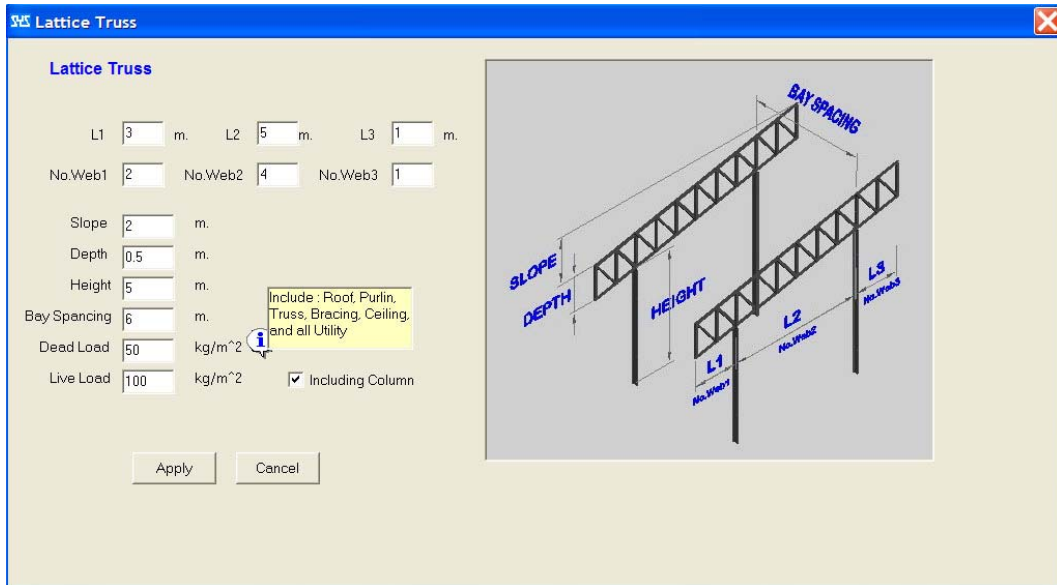


Figure 6. Lattice Truss Design Module

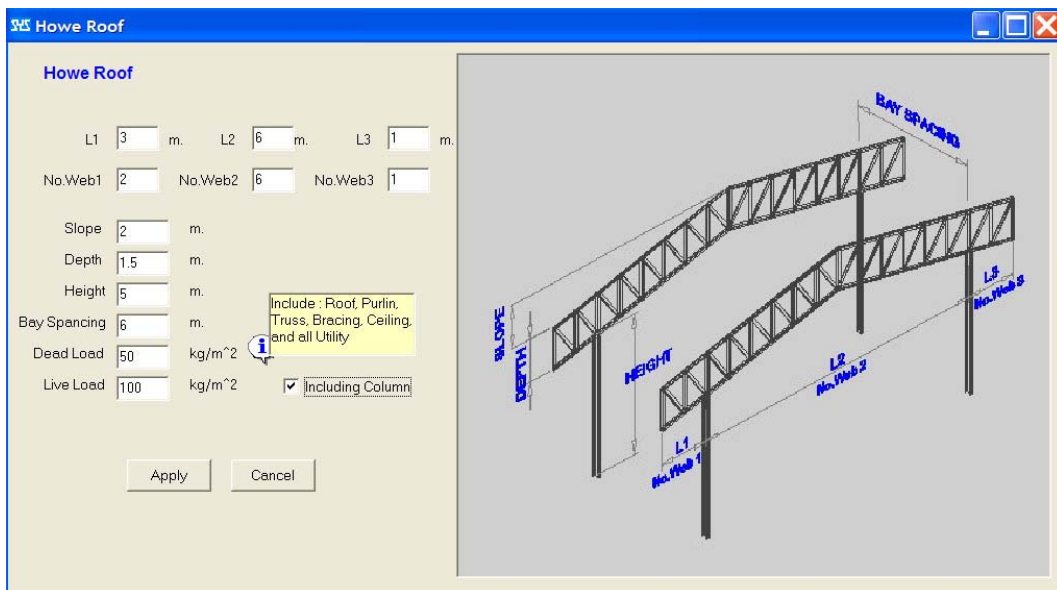


Figure 7. Howe Truss Design Module

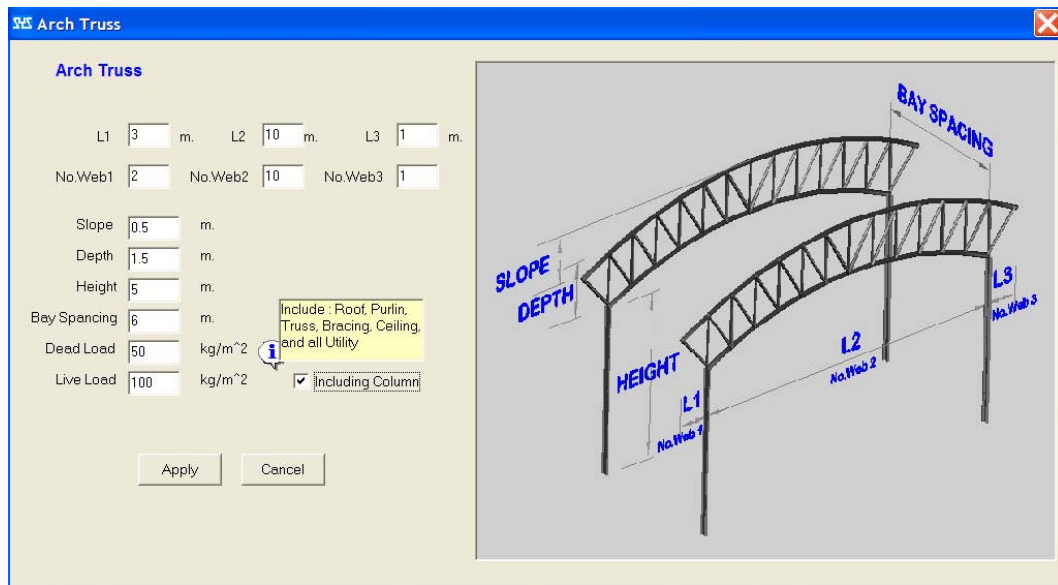


Figure 8. Arch Truss Design Module

Steel truss design module provides the design of lattice truss, howe truss and arch truss geometry as shown in Figure 6-8. All joints in model of truss are pinned joints. The dead load and live load are applied to truss member by point load at joint. All information required for truss design such as truss and column geometry, member section, dead load, live load and so on, shall be prepared and filled in the input box by users. The option on truss geometry advisor is provided for user as a first start of design, then user can modify the data for his/her designed variables.

Design Module 2: Steel Frame Design

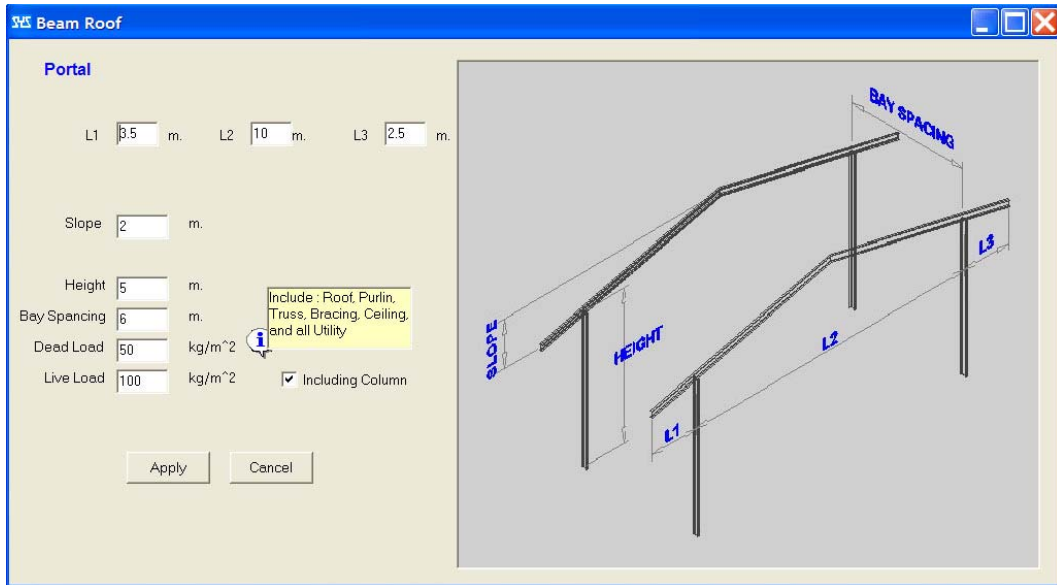


Figure 9. Steel Frame Design Module

Steel frame design module provides the design of roof frame structure as shown in Figure 9. All joints in model of roof frame are fixed joints. The dead load and live load are applied to frame member by uniform load along the member. All information required for frame design such as frame geometry, member section, dead load, live load and so on, shall be prepared and filled in the input box by users.

Design Module 3: Steel Floor Design

SYS Floor

Length m. Width m.
 No. Bay No. Bay

No	Length
1	2.67
2	2.67
3	2.67

No	Width
1	3.00
2	3.00
3	3.00

Apply to Floor Level To Level Height m.
 Floor DataBase

Figure 10. Steel Floor Design Module

Steel floor design module provides the design of floor structure as shown in Figure 10. All joints in model of floor frame are fixed joints. The dead load and live load are applied to floor member by uniform load along the member. All information required for frame design such as floor geometry, support location, member section, type of slab design, dead load, live load and so on, shall be prepared and filled in the input box by users.

Design Modules

Steel Truss Design

Steel truss design module provides the design of lattice truss, howe truss and arch truss geometry. All joints in model of truss are pinned joints. The dead load and live load are applied to truss member by point load at joint. All members are carrying compression and tension force from applied load. All information required for truss design such as truss and column geometry, member section, dead load, live load and so on, shall be prepared and filled in the input box by users.

Input Mode

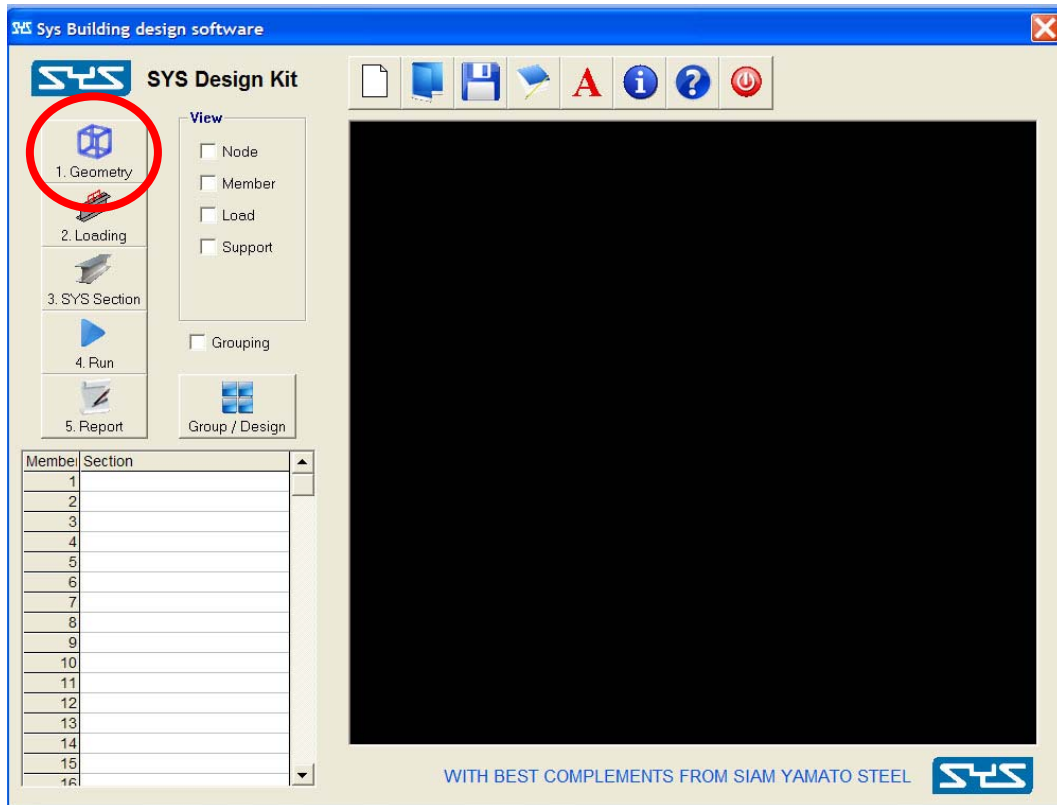


- 1) Steel truss design can be selected by clicking “Using Advisor” or “Go to Program” and then clicking “OK”

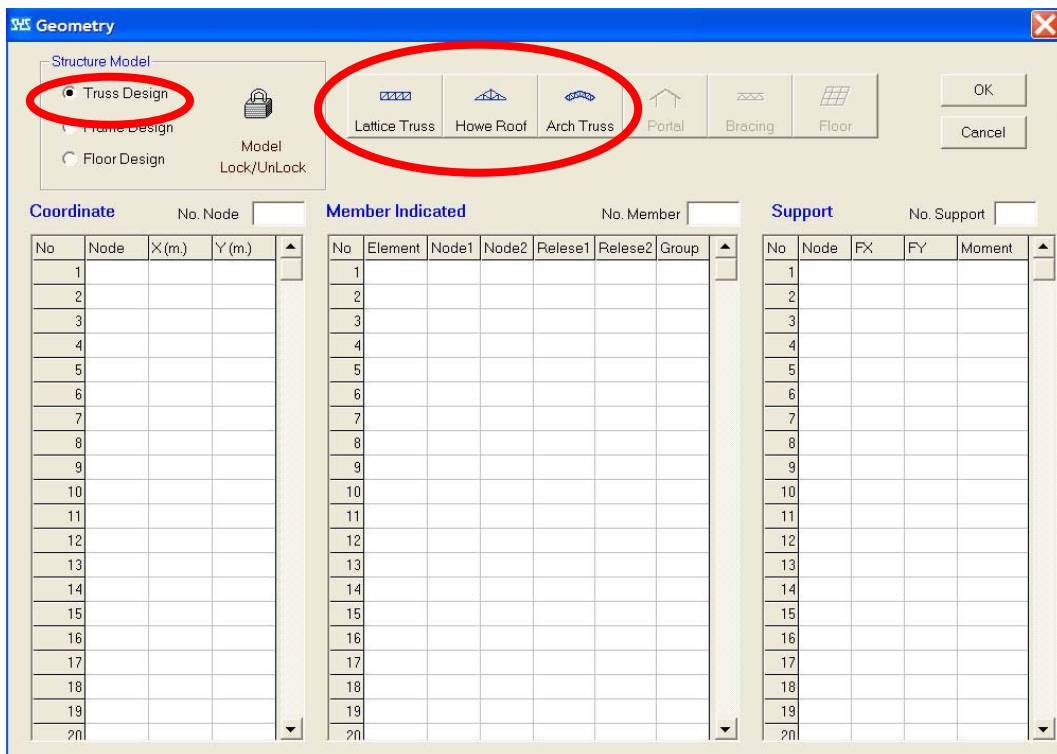
Using Advisor Button :	Program will help user to crate geometry of truss, see explanation in Advisor Input Mode
Go to ProgramButton :	Go to normal main menu input program

- 2) Clicking “1.Geometry” button for input geometry of truss. In main menu page, there are “View” type for user to select display type of information in truss as described below

Node	:	Display node number of truss
Member	:	Display member number of truss
Load	:	Display load location, direction and magnitude
Support	:	Display support location



- 3) Clicking “Truss Design” and then select type of truss: “Lattice Truss”, “Howe Truss” and “Arch Truss”.



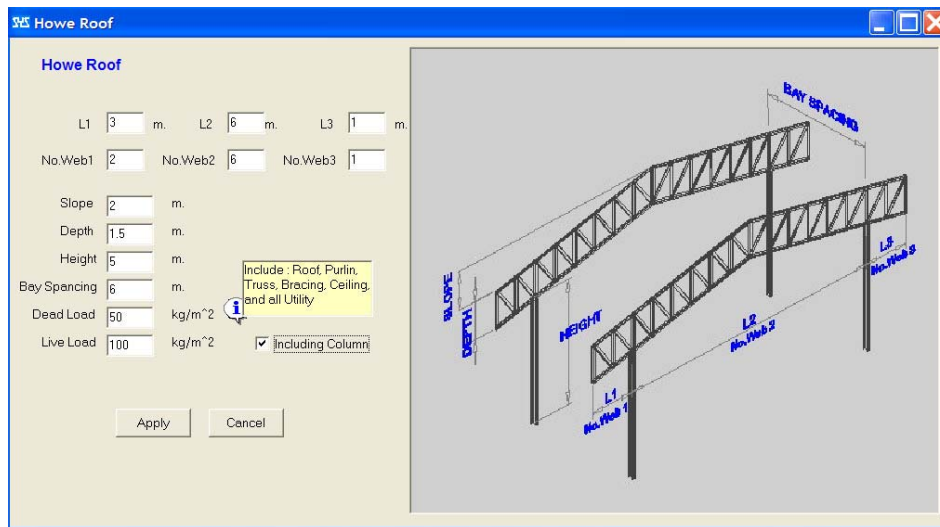
4) For Lattice Truss Design, variables are required to be filled as follows

L1	:	Left cantiliver span length in meter
No. of Web1	:	Number of web in left cantiliver span
L2	:	Middle span length in meter
No. of Web2	:	Number of web in middle span
L3	:	Right cantiliver length in meter
No. of Web3	:	Number of web in right cantiliver span
Slope	:	Different elevation (slope) between left and right truss in meter
Depth	:	Depth of truss in meter
Height (H1)	:	Height of left column in meter
Bay Spacing (S)	:	Spacing between bay of column in meter
Dead load	:	Dead load in kilogram per square meter including load of roof, purlin, truss, bracing, ceiling and all utility
Live load	:	Live load in kilogram per square meter
Including column	:	Including or not including column in design

5) For Howe Truss Design, variables are required to be filled as follows

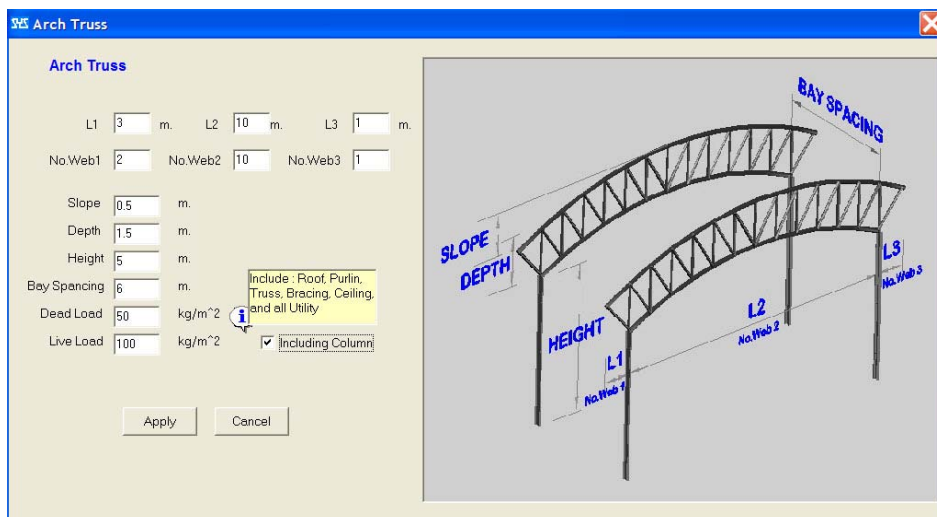
L1	:	Left cantiliver span length in meter
No. of Web1	:	Number of web in left cantiliver span
L2	:	Middle span length in meter
No. of Web2	:	Number of web in middle span
L3	:	Right cantiliver length in meter
No. of Web3	:	Number of web in right cantiliver span
Slope	:	Different elevation (slope) between left and right column in meter
Depth	:	Depth of truss in meter
Height (H1)	:	Height of left column in meter
Bay Spacing (S)	:	Spacing between bay of column in meter
Dead load	:	Dead load in kilogram per square meter including load of roof, purlin, truss, bracing, ceiling and all utility
Live load	:	Live load in kilogram per square meter

Including column : Including or not including column in design



6) For Arch Truss Design, variables are required to be filled as follows

L1	:	Left cantiliver span length in meter
No. of Web1	:	Number of web in left cantiliver span
L2	:	Middle span length in meter
No. of Web2	:	Number of web in middle span
L3	:	Right cantiliver length in meter
No. of Web3	:	Number of web in right cantiliver span
Slope	:	Different elevation (slope) between left and right column in meter
Depth	:	Depth of truss in meter
Height (H1)	:	Height of left column in meter
Bay Spacing (S)	:	Spacing between bay of column in meter
Dead load	:	Dead load in kilogram per square meter including load of roof, purlin, truss, bracing, ceiling and all utility
Live load	:	Live load in kilogram per square meter
Including column	:	Including or not including column in design



- 7) Then “Coordinate”, “Member indicated” and “Support” will be created in window and then clicking “OK” to go back to main menu. The user can edit any data of “Coordinate”, “Member indicated” and “Support” by double click and edit data in the window.

Geometry

Structure Model

☒ Truss Design
☐ Frame Design
☐ Floor Design

Model Lock/Unlock

Lattice Truss Howe Roof Arch Truss Portal Bracing Floor

OK Cancel

Coordinate No. Node 18

No	Node	X(m)	Y(m)
1	1	0.00	5.00
2	2	1.50	5.33
3	3	3.00	5.67
4	4	4.25	5.94
5	5	5.50	6.22
6	6	6.75	6.50
7	7	8.00	6.78
8	8	9.00	7.00
9	9	0.00	5.50
10	10	1.50	5.83
11	11	3.00	6.17
12	12	4.25	6.44
13	13	5.50	6.72
14	14	6.75	7.00
15	15	8.00	7.28
16	16	9.00	7.50
17	17	3.00	0.00
18	18	8.00	0.00

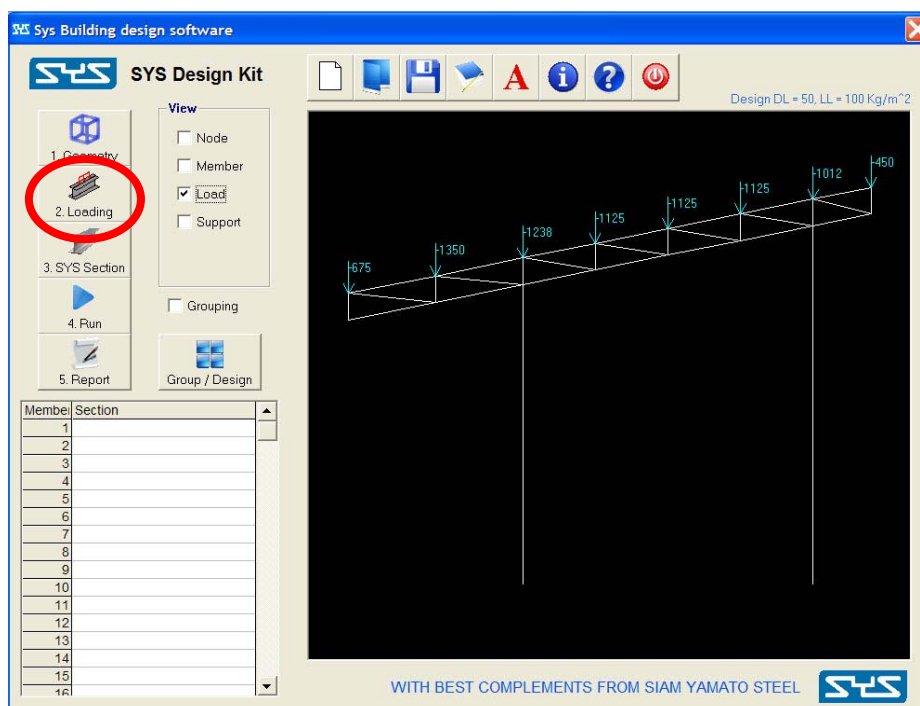
Member Indicated No. Member 31

No	Element	Node1	Node2	Release1	Release2	Group
1	1	1	2			1
2	2	2	3			1
3	3	3	4			1
4	4	4	5			1
5	5	5	6			1
6	6	6	7			1
7	7	7	8			1
8	8	9	10			2
9	9	10	11			2
10	10	11	12			2
11	11	12	13			2
12	12	13	14			2
13	13	14	15			2
14	14	15	16			2
15	15	1	9			3
16	16	2	10			3
17	17	3	11			3
18	18	4	12			3
19	19	5	13			3
20	20	6	14			3

Support No. Support 2

No	Node	FX	FY	Moment
1	17	1	1	1
2	18	1	1	1

- 8) Clicking “2.Loading” button in main menu to go to edit load data and clicking “OK” to go back to main menu. Program will automatically generate point load from dead load and point load data in step 4 or 5 or 6. For other applied force such as wind load, seismic load, user can edit load data in window by clicking and editing load at the joint number.



Force

No. Point Load No. Uniform Load

No	Node	FX (kg.)	FY (kg.)
1	9	0	-675
2	10	0	-1350
3	11	0	-1238
4	12	0	-1125
5	13	0	-1125
6	14	0	-1125
7	15	0	-1012
8	16	0	-450

No	Member	W (kg/m)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

OK

- 9) Select “SYS Section” button to go to input steel section. User can select “H-Section”, “I-Section”, “Channels”, “Angles” and “Cut beam” from left column to “Attention Table” in the right column for program to use this section to design. More steel section from SYS are provided in program by clicking “Including Sub Series”. The sub series sections are not normal sections in the market. Please ask SYS for more information.

Select “Steel Grade” of member by clicking buttons in front of type of steel grade.

SYS Building design software

SYS Design Kit

View: ☒ Node ☒ Member ☒ Load ☒ Support ☐ Grouping

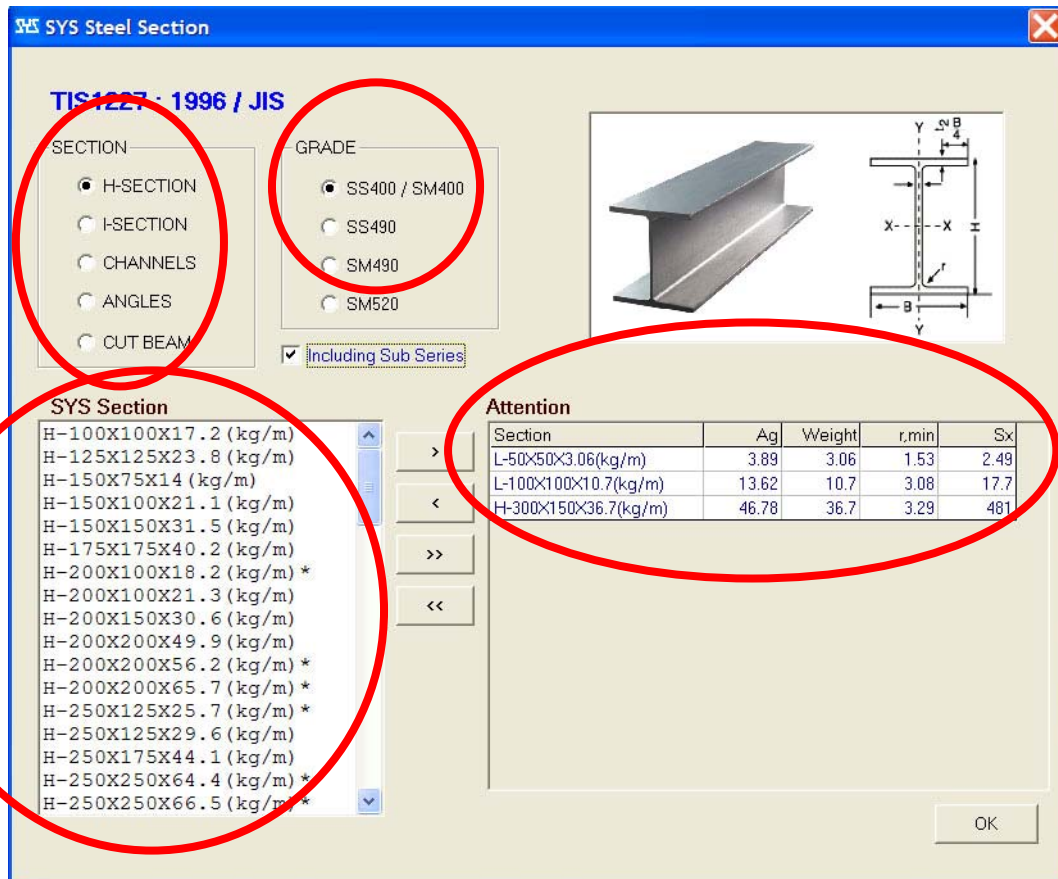
1. Geometry 2. Section 3. **SYS Section** 4. Run 5. Report

Member Section

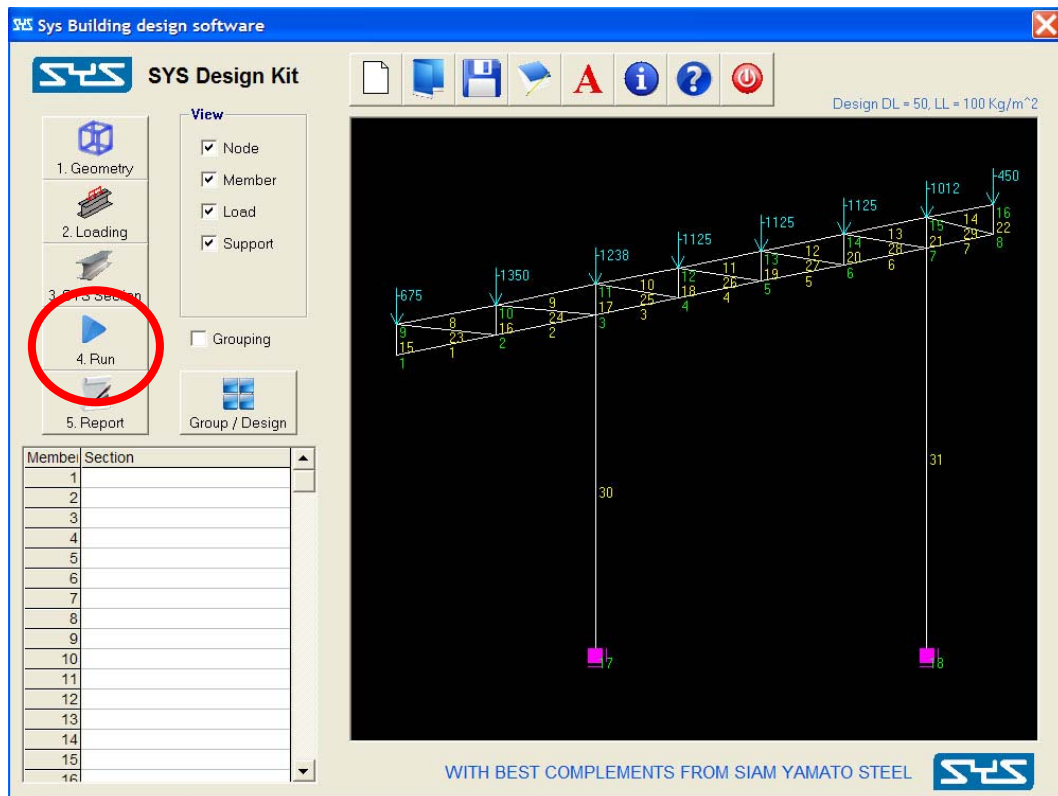
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	

Design DL = 50, LL = 100 Kg/m²

WITH BEST COMPLEMENTS FROM SIAM YAMATO STEEL



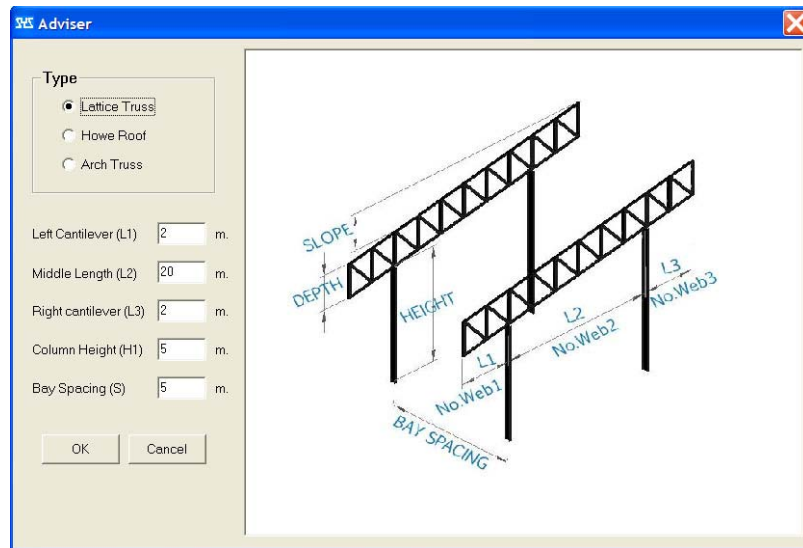
10) Run the program by clicking “4.Run” button.



Advisor Input Mode

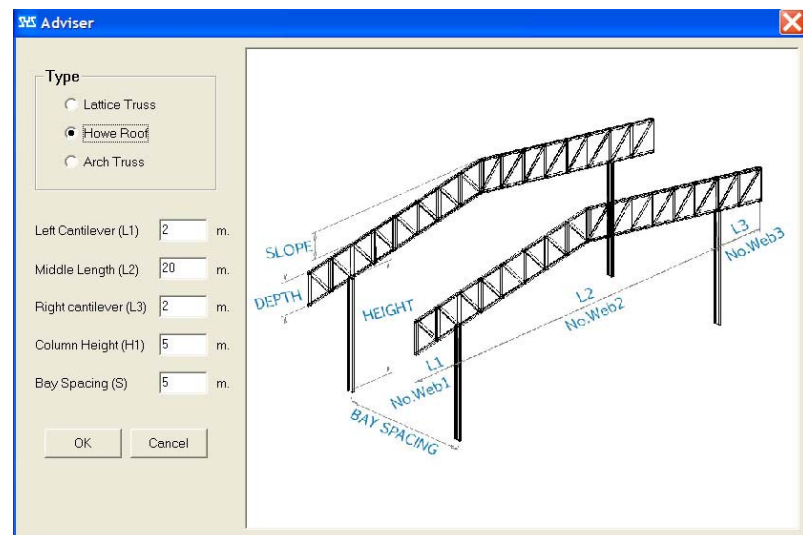
A) For lattice truss, user can use advisor input mode for helping to create truss geometry.

L1	:	Left cantiliver span length in meter
L2	:	Middle span length in meter
L3	:	Right cantiliver length in meter
Height (H1)	:	Height of left column in meter
Bay Spacing (S)	:	Spacing between bay of column in meter



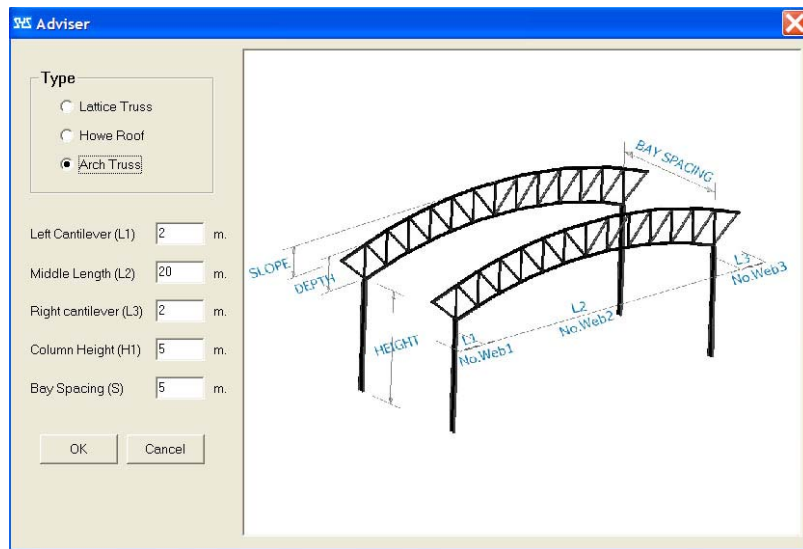
B) For howe truss, user can use advisor input mode for helping to create truss geometry.

L1	:	Left cantiliver span length in meter
L2	:	Middle span length in meter
L3	:	Right cantiliver length in meter
Height (H1)	:	Height of left column in meter
Bay Spacing (S)	:	Spacing between bay of column in meter



C) For arch truss, user can use advisor input mode for helping to create truss geometry.

L1	:	Left cantiliver span length in meter
L2	:	Middle span length in meter
L3	:	Right cantiliver length in meter
Height (H1)	:	Height of left column in meter
Bay Spacing (S)	:	Spacing between bay of column in meter



D) After input advior mode, the user can edit data and input more data by procedure step 2-10.

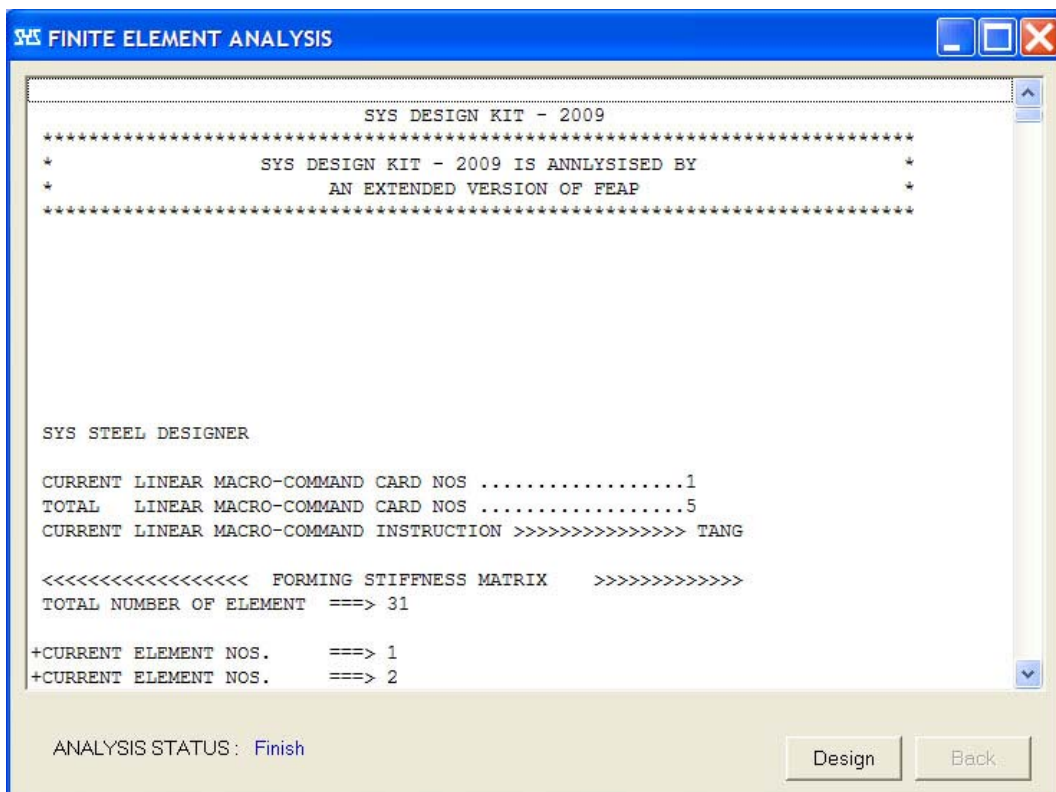
Result Mode

- 11) The design outputs are shown in figure. The information including analysis procedure, member axial force, member shear force, member torsion, member moment and design steel section.

The design checks are performed including the followings:

- Check for member axial force
- Check for member shear force
- Check for column axial force
- Check for column shear force
- Check for column moment force

The minimum section property in attention table will be checked for each member design. If the allowable design stress exceed the capacity stress, the stronger section property in attention table will be rechecked



FINITE ELEMENT ANALYSIS							
Member	Node	Axial	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
1	NODE(1)	7.0548E+00	-2.1228E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.6021E+00
	MIDSPAN					0.0000E+00	-2.8069E-02
2	NODE(2)	-7.0548E+00	2.1228E+00	0.0000E+00	0.0000E+00	0.0000E+00	-1.6582E+00
	MIDSPAN	2.1020E+03	-8.3925E+00	0.0000E+00	0.0000E+00	0.0000E+00	-4.8445E+00
3	NODE(3)	-2.1020E+03	8.3925E+00	0.0000E+00	0.0000E+00	0.0000E+00	-8.0635E+00
	MIDSPAN	8.2366E+03	1.2963E+01	0.0000E+00	0.0000E+00	0.0000E+00	1.1258E+01
4	NODE(4)	-8.2366E+03	-1.2963E+01	0.0000E+00	0.0000E+00	0.0000E+00	5.3194E+00
	MIDSPAN	2.1191E+03	2.9268E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.6224E+00
5	NODE(5)	-2.1191E+03	-2.9268E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.1267E+00
	MIDSPAN	-1.1521E+03	1.0212E-02	0.0000E+00	0.0000E+00	0.0000E+00	-7.4634E-01
6	NODE(6)	1.1521E+03	-1.0212E-02	0.0000E+00	0.0000E+00	0.0000E+00	7.5288E-01
	MIDSPAN	-1.5432E+03	-4.2544E+00	0.0000E+00	0.0000E+00	0.0000E+00	-3.0299E+00
7	NODE(7)	1.5432E+03	4.2544E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.4198E+00
	MIDSPAN	9.1310E+02	3.6941E+00	0.0000E+00	0.0000E+00	0.0000E+00	-5.9419E-01
8	NODE(8)	-9.1310E+02	-3.6941E+00	0.0000E+00	0.0000E+00	0.0000E+00	1.2970E+00
	MIDSPAN	-2.0660E+03	-9.4928E-01	0.0000E+00	0.0000E+00	0.0000E+00	-8.2500E-01

ANALYSIS STATUS: Finish

Design Back

12) The design member sections are shown member-section table.

Sys Building design software

SYS Design Kit

Design DL = 50, LL = 100 Kg/m²

View

- ☒ Node
- ☒ Member
- ☒ Load
- ☒ Support
- ☐ Grouping
- ☐ Group / Design

1. Geometry

2. Loading

3. SYS Section

4. Run

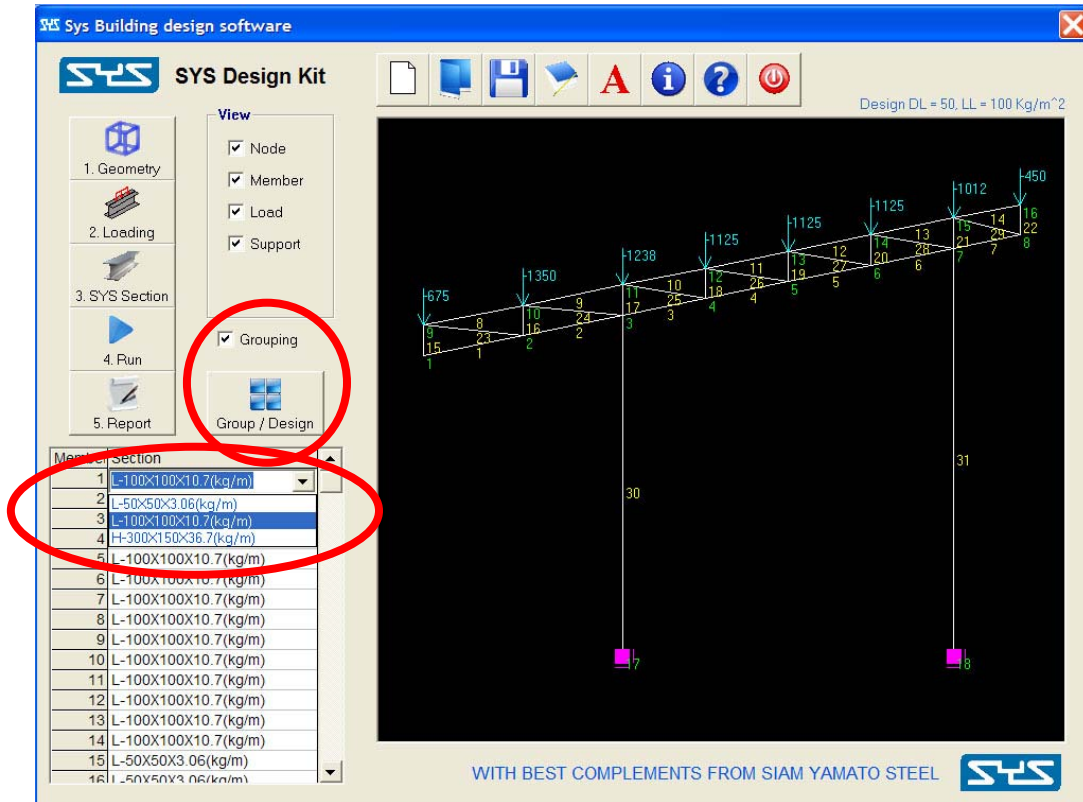
5. Report

Member Section

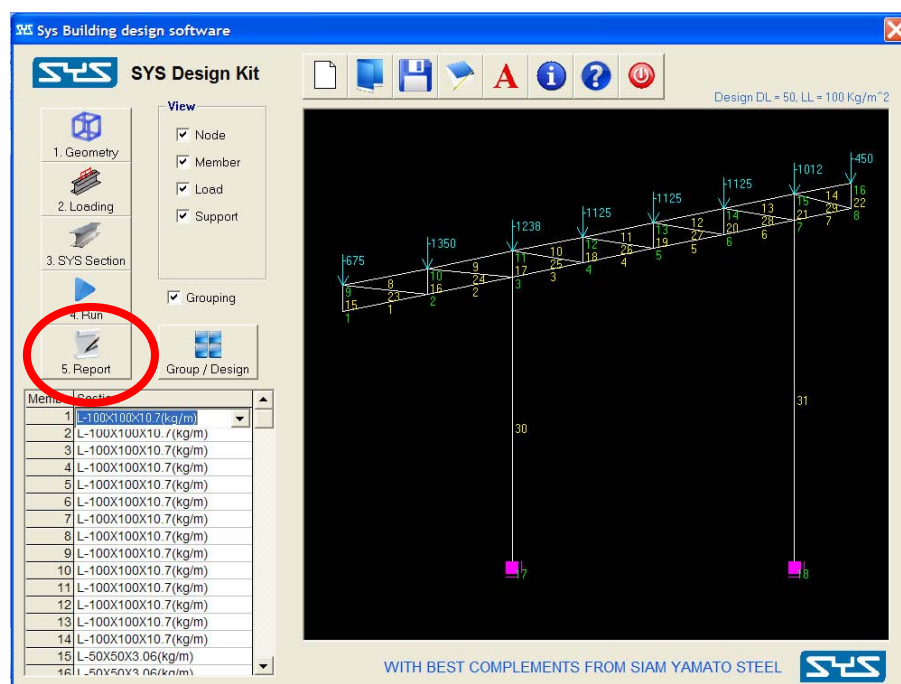
1	L-50X50X3.06(kg/m)
2	L-50X50X3.06(kg/m)
3	L-100X100X10.7(kg/m)
4	L-50X50X3.06(kg/m)
5	L-50X50X3.06(kg/m)
6	L-50X50X3.06(kg/m)
7	L-50X50X3.06(kg/m)
8	L-50X50X3.06(kg/m)
9	L-100X100X10.7(kg/m)
10	L-50X50X3.06(kg/m)
11	L-50X50X3.06(kg/m)
12	L-50X50X3.06(kg/m)
13	L-50X50X3.06(kg/m)
14	L-50X50X3.06(kg/m)
15	L-50X50X3.06(kg/m)
16	L-50X50X3.06(kg/m)

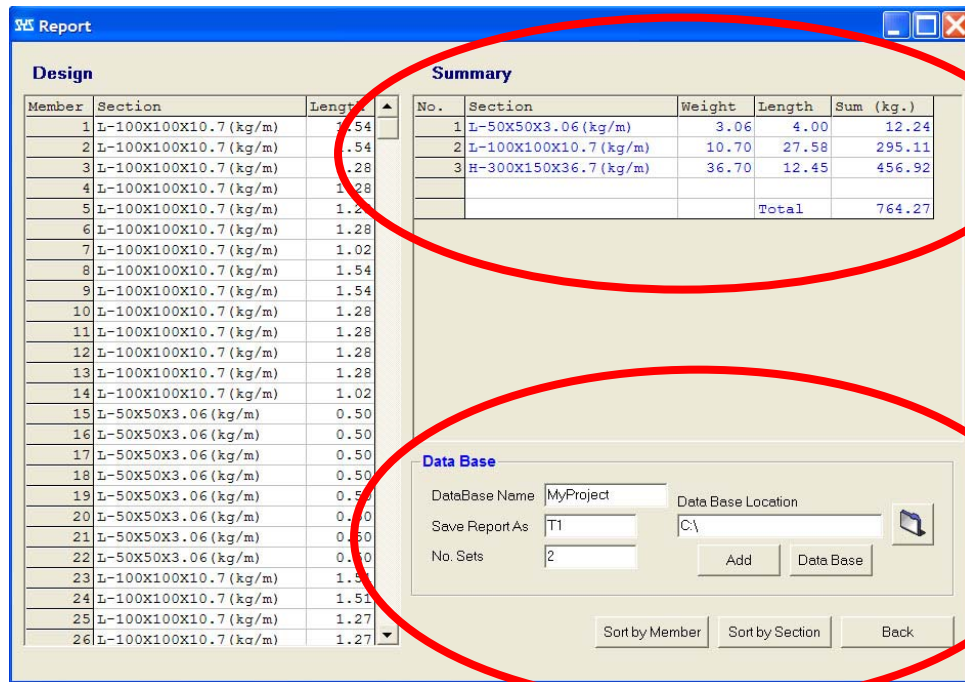
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- 13) In practice, the top chord member, bottom chord member and diagonal member along truss length should be the same section for each member type. Group for each type of member can selecting by checking in front of “Grouping” and clicking “Group/Design” button. User can edit member section for each member by double click at member section and change member section in the list.



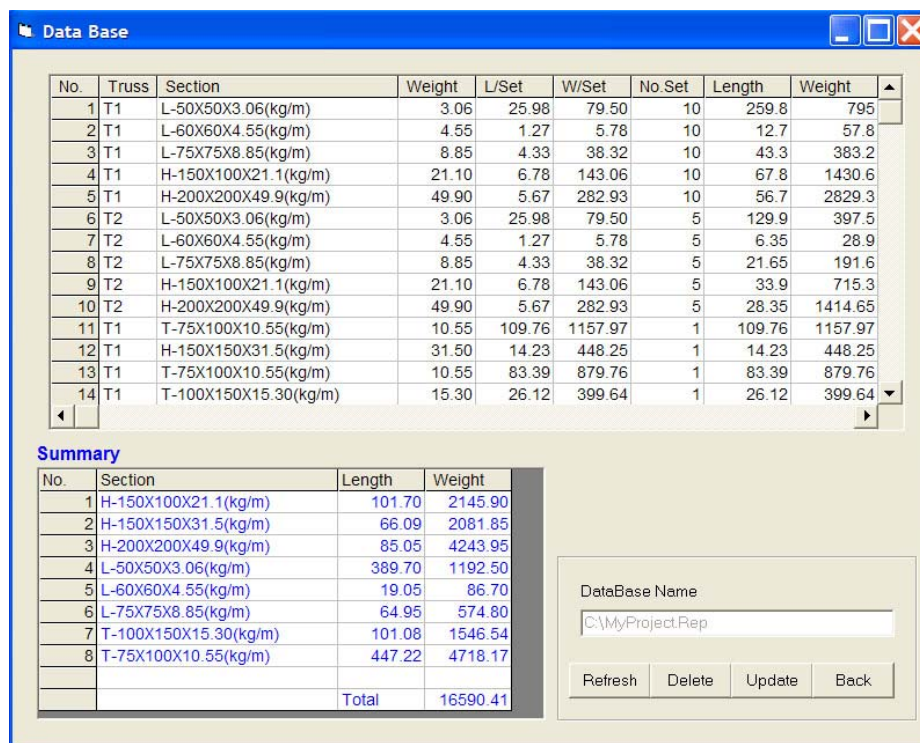
- 14) Clicking “5.Report” to see member design section, summary of steel section, summary of steel weight and save data to database.





- “Sort by Member” : Rearrange the design member table in left table by member number
- “Sort by Section” : Rearrange the design member table in left table by section of member
- “Data Base Location” : Select the location of data base to be saved
- “Data Base Name” : Name of data base to be saved
- “Save Report As” : Name of truss output to be saved
- “No. Sets” : Number set of truss in project

15) After clicking “Data base” button, the summary of all truss section in database will show.



Steel Frame Design

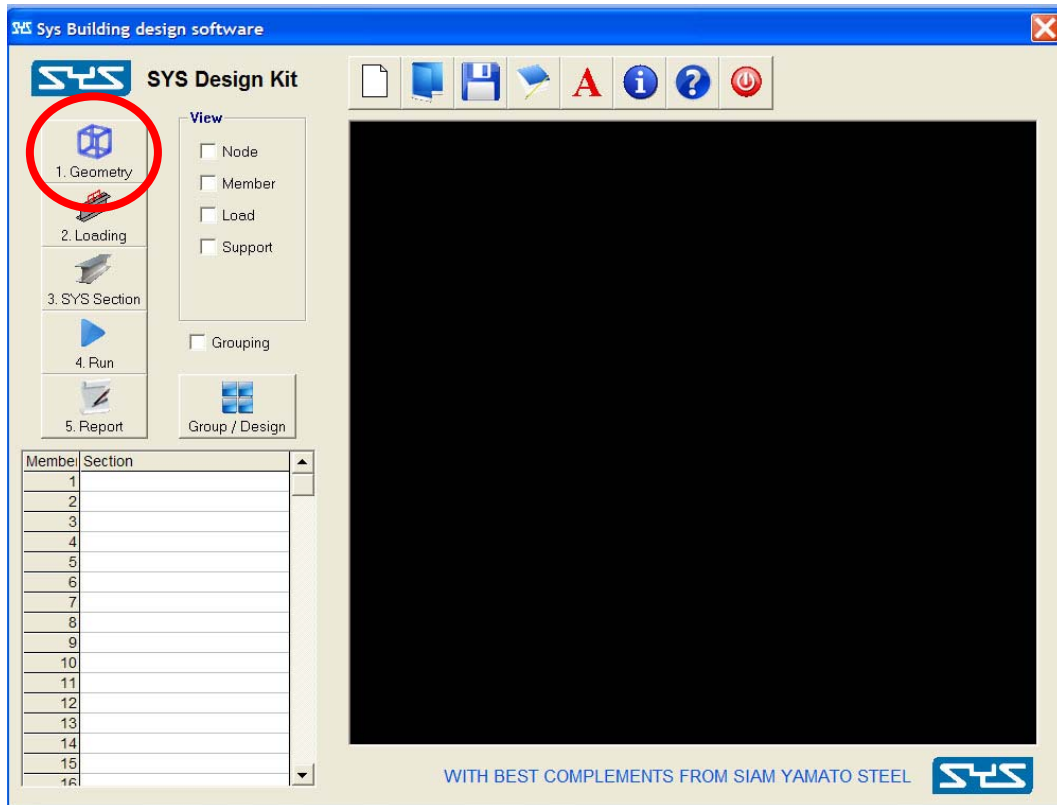
Steel frame design module provides the design of roof frame structure. All joints in model of frame are fixed joints. The dead load and live load are applied to frame member by uniform load along member. All members are carrying axial force, shear force and moment force from applied load. All information required for design such as roof frame and column geometry, member section, dead load, live load and so on, shall be prepared and filled in the input box by users.

Input Mode

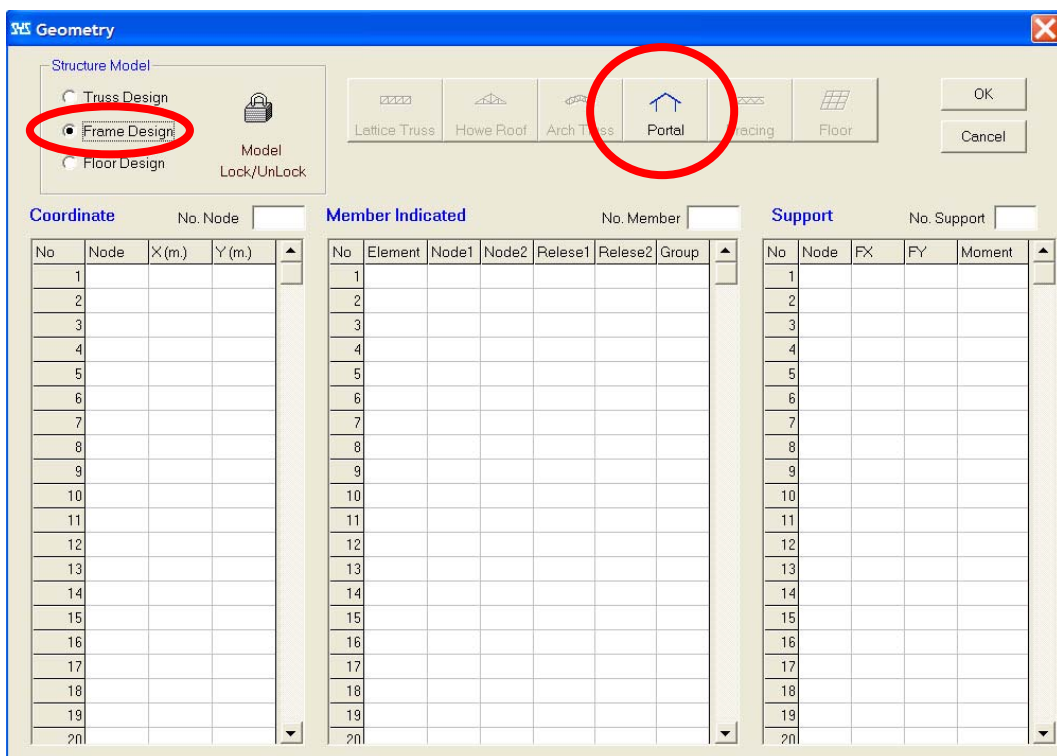


- 1) Steel frame design can be selected by clicking “Go to Program” and then clicking “OK”
- 2) Clicking “1.Geometry” button for input geometry of frame. In main menu page, there are “View” type for user to select display type of information in truss as described below

Node	:	Display node number of frame
Member	:	Display member number of frame
Load	:	Display load location, direction and magnitude
Support	:	Display support location



3) Clicking “Frame Design” and then select “Portal”.



4) For portal frame design, variables are required to be filled as follows

L1	:	Left cantiliver span length in meter
L2	:	Middle span length in meter
L3	:	Right cantiliver length in meter
Slope	:	Different elevation (slope) between top of roof and top of column in meter
Height (H1)	:	Height of column in meter
Bay Spacing (S)	:	Spacing between bay of column in meter
Dead load	:	Dead load in kilogram per square meter including load of roof, purlin, truss, bracing, ceiling and all utility
Live load	:	Live load in kilogram per square meter
Including column	:	Including or not including column in design

Portal

L1: 3.5 m, L2: 10 m, L3: 2.5 m

Slope: 2 m

Height: 5 m

Bay Spacing: 6 m

Dead Load: 50 kg/m²

Live Load: 100 kg/m²

☒ Including Column

Include: Roof, Purlin, Truss, Bracing, Ceiling, and all Utility

Apply Cancel

5) Then “Coordinate”, “Member indicated” and “Support” will be created in window and then clicking “OK” to go back to main menu. The user can edit any data of “Coordinate”, “Member indicated” and “Support” by double click and edit data in the window.

Geometry

Structure Model

☐ Truss Design ☒ Frame Design ☐ Floor Design

Model Lock/UnLock

Lattice Truss Howe Roof Arch Truss Portal Bracing Floor

Coordinate No. Node 18

No	Node	X(m)	Y(m)
1	1	0.00	5.00
2	2	1.17	5.47
3	3	2.33	5.93
4	4	3.50	6.40
5	5	4.50	6.80
6	6	5.50	7.20
7	7	6.50	7.60
8	8	7.50	8.00
9	9	8.50	8.40
10	10	9.50	8.80
11	11	10.50	7.60
12	12	11.50	7.20
13	13	12.50	6.80
14	14	13.50	6.40
15	15	14.75	5.90
16	16	16.00	5.40
17	17	3.50	0.00
18	18	13.50	0.00

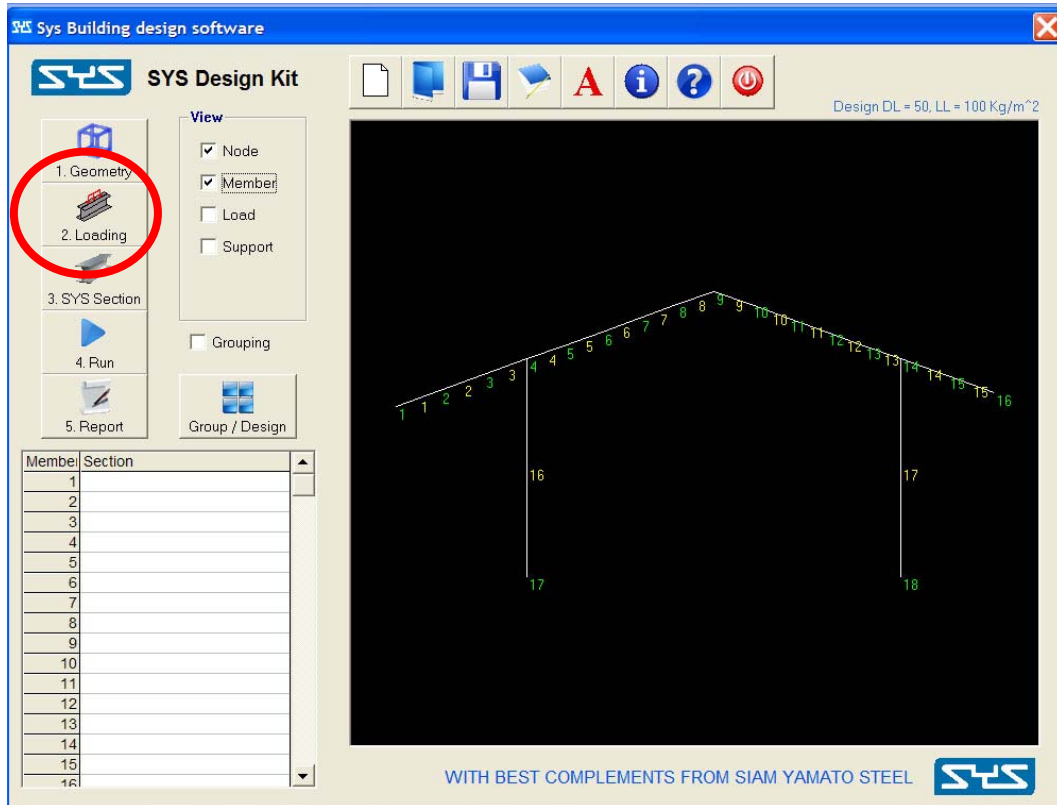
Member Indicated No. Member 17

No	Member	Node1	Node2	Release1	Release2	Group
1	1	1	2			1
2	2	2	3			1
3	3	3	4			1
4	4	4	5			1
5	5	5	6			1
6	6	6	7			1
7	7	7	8			1
8	8	8	9			1
9	9	9	10			1
10	10	10	11			1
11	11	11	12			1
12	12	12	13			1
13	13	13	14			1
14	14	14	15			1
15	15	15	16			1
16	16	17	4			2
17	17	18	14			2

Support No. Support 2

No	Node	FX	FY	Moment
1	17	1	1	1
2	18	1	1	1

- 6) Clicking “2.Loading” button in main menu to go to edit load data and clicking “OK” to go back to main menu. Program will automatically generate point load from dead load and point load data in step 4. For other applied force such as wind load, seismic load, user can edit load data in window by clicking and editing load at the joint number.



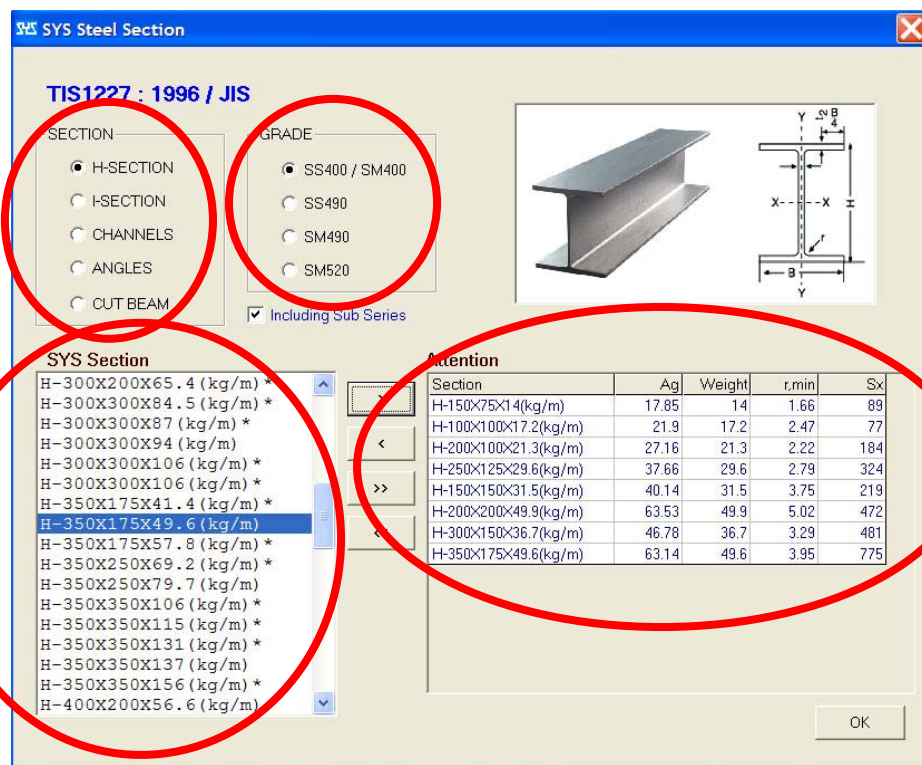
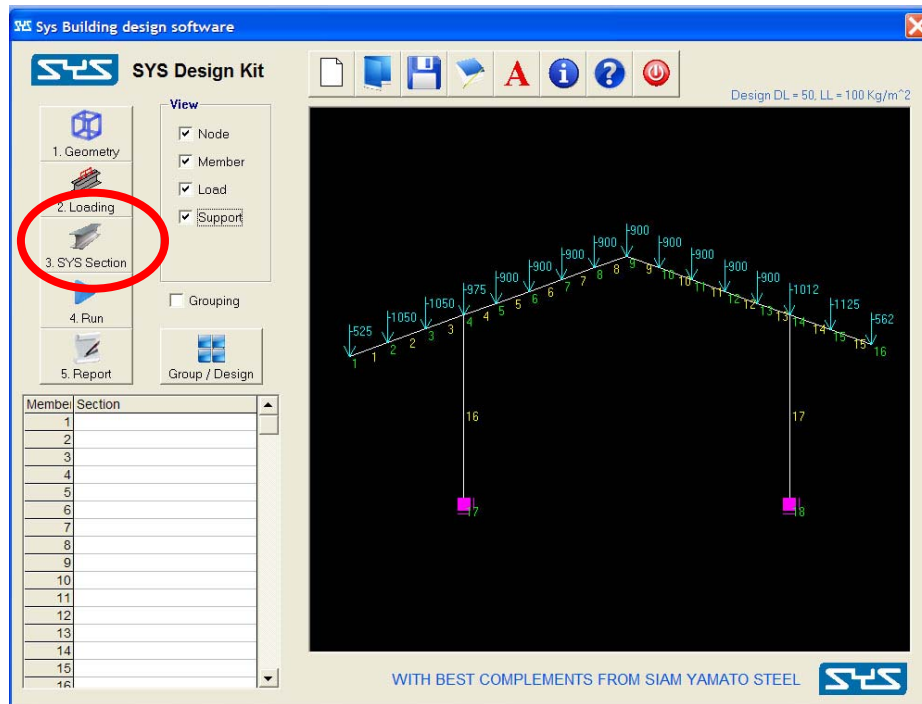
The 'Force' dialog box is shown, allowing the user to define point and uniform loads. It includes an 'OK' button at the top right. The 'No. Point Load' is set to 16, and the 'No. Uniform Load' is currently empty. Below these are two tables for data entry.

No	Node	FX (kg.)	FY (kg.)
1	1	0	-525
2	2	0	-1050
3	3	0	-1050
4	4	0	-975
5	5	0	-900
6	6	0	-900
7	7	0	-900
8	8	0	-900
9	9	0	-900
10	10	0	-900
11	11	0	-900

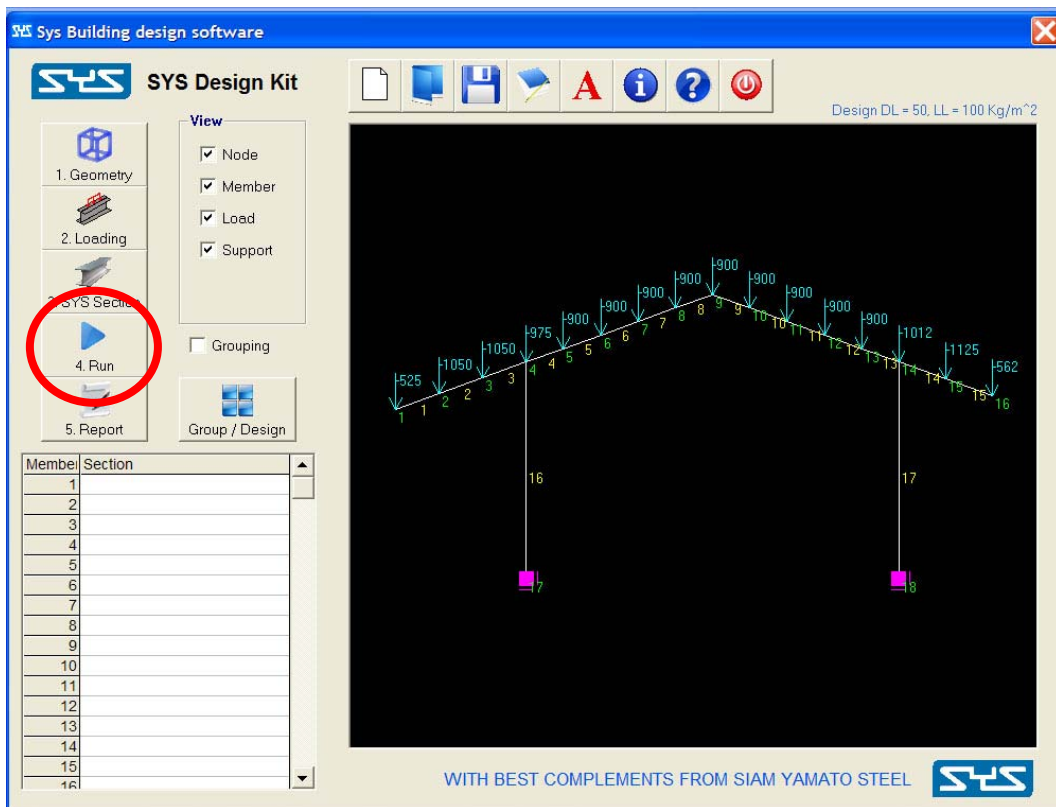
No	Member	W (kg/m)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

- 7) Select “SYS Section” button to go to input steel section. User can select “H-Section”, “I-Section”, “Channels”, “Angles” and “Cut beam” from left column to “Attention Table” in the right column for program to use this section to design. More steel section from SYS are provided in program by clicking “Including Sub Series”. The sub series sections are not normal sections in the market. Please ask SYS for more information.

Select “Steel Grade” of member by clicking buttons in front of type of steel grade.



8) Run the program by clicking “4.Run” button.



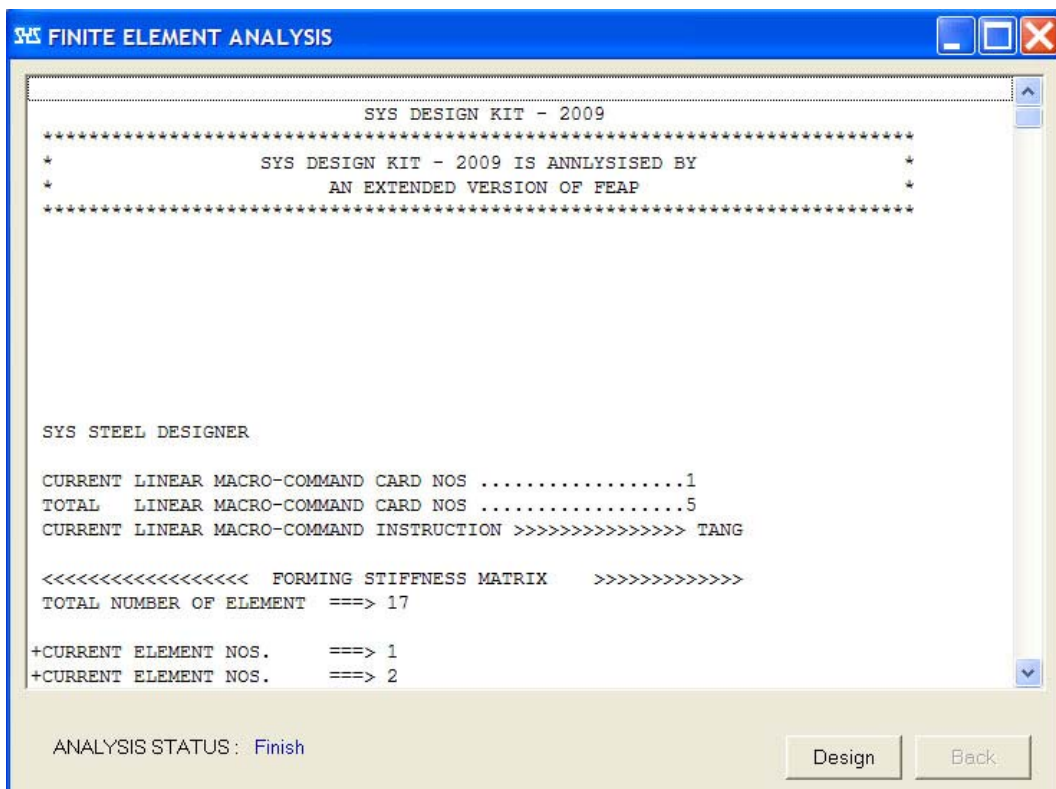
Result Mode

- 9) The design outputs are shown in figure. The information including analysis procedure, member axial force, member shear force, member torsion, member moment and design steel section.

The design checks are performed including the followings:

- Check for member axial force
- Check for member shear force
- Check for column axial force
- Check for column shear force
- Check for column moment force

The minimum section property in attention table will be checked for each member design. If the allowable design stress exceed the capacity stress, the stronger section property in attention table will be rechecked



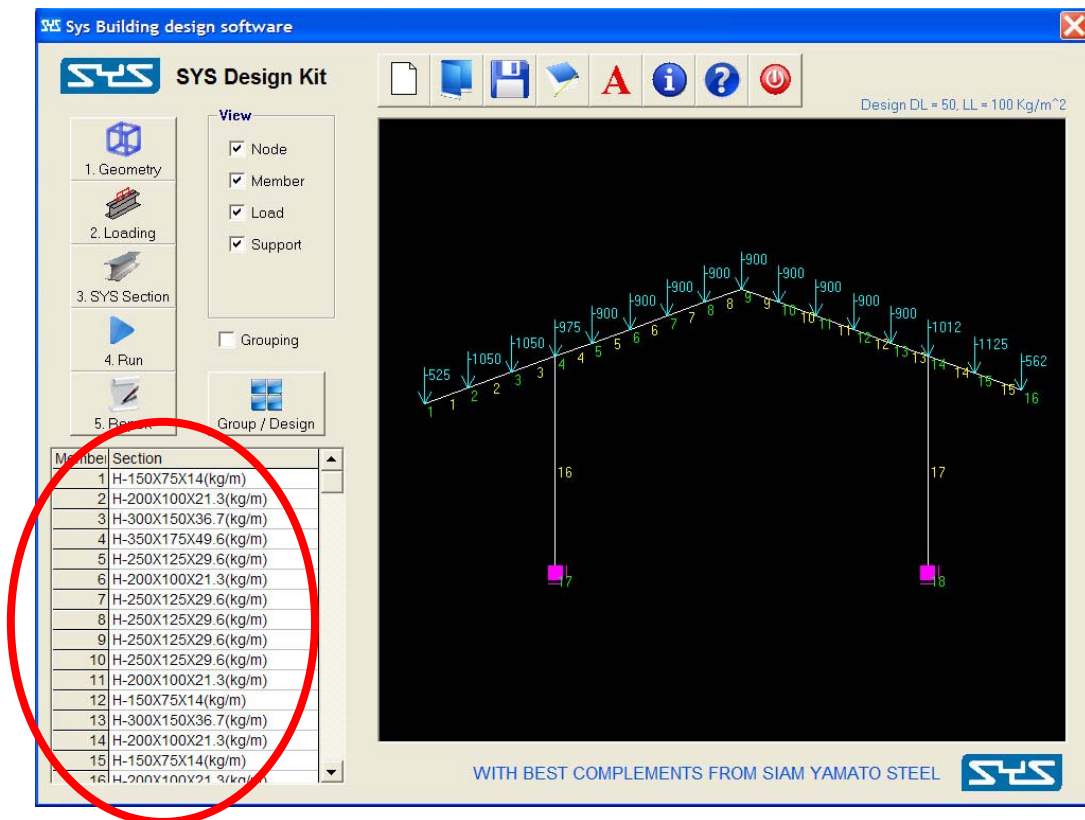
FINITE ELEMENT ANALYSIS

Member	Node	Axial	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
1	NODE(1)	-1.9570E+02	4.8716E+02	0.0000E+00	0.0000E+00	0.0000E+00	-9.0949E-12
	MIDSPAN					0.0000E+00	3.0712E+02
	NODE(2)	1.9570E+02	-4.8716E+02	0.0000E+00	0.0000E+00	0.0000E+00	6.1425E+02
2	NODE(2)	-5.8059E+02	1.4641E+03	0.0000E+00	0.0000E+00	0.0000E+00	-6.1425E+02
	MIDSPAN					0.0000E+00	1.5277E+03
	NODE(3)	5.8059E+02	-1.4641E+03	0.0000E+00	0.0000E+00	0.0000E+00	2.4412E+03
3	NODE(3)	-9.7849E+02	2.4358E+03	0.0000E+00	0.0000E+00	0.0000E+00	-2.4412E+03
	MIDSPAN					0.0000E+00	3.9769E+03
	NODE(4)	9.7849E+02	-2.4358E+03	0.0000E+00	0.0000E+00	0.0000E+00	5.5125E+03
4	NODE(4)	2.2018E+03	-3.7085E+03	0.0000E+00	0.0000E+00	0.0000E+00	-7.5620E+03
	MIDSPAN					0.0000E+00	5.5649E+03
	NODE(5)	-2.2018E+03	3.7085E+03	0.0000E+00	0.0000E+00	0.0000E+00	3.5679E+03
5	NODE(5)	1.8675E+03	-2.8729E+03	0.0000E+00	0.0000E+00	0.0000E+00	-3.5679E+03
	MIDSPAN					0.0000E+00	2.0208E+03
	NODE(6)	-1.8675E+03	2.8729E+03	0.0000E+00	0.0000E+00	0.0000E+00	4.7371E+02
6	NODE(6)	1.5333E+03	-2.0372E+03	0.0000E+00	0.0000E+00	0.0000E+00	-4.7371E+02
	MIDSPAN					0.0000E+00	-6.2337E+02
	NODE(7)	-1.5333E+03	2.0372E+03	0.0000E+00	0.0000E+00	0.0000E+00	-1.7204E+03
7	NODE(7)	1.1990E+03	-1.2016E+03	0.0000E+00	0.0000E+00	0.0000E+00	1.7204E+03
	MIDSPAN					0.0000E+00	-2.3675E+03
	NODE(8)	-1.1990E+03	1.2016E+03	0.0000E+00	0.0000E+00	0.0000E+00	-3.0146E+03
8	NODE(8)	8.6476E+02	-3.6597E+02	0.0000E+00	0.0000E+00	0.0000E+00	3.0146E+03

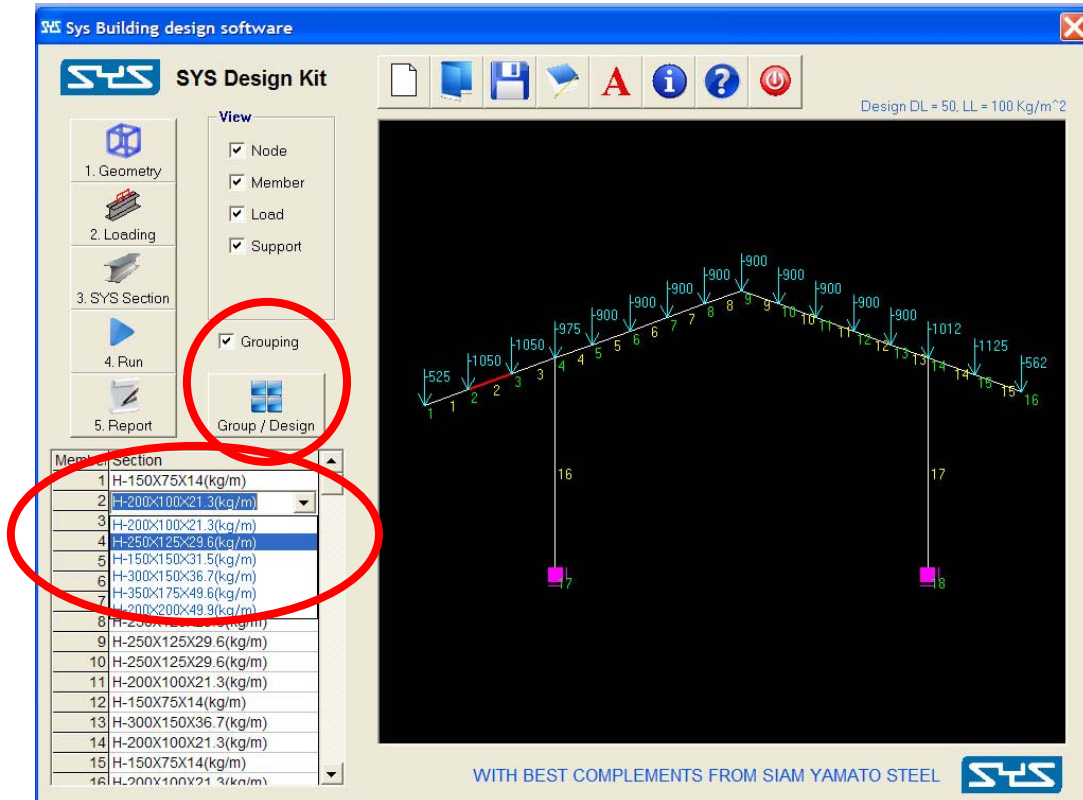
ANALYSIS STATUS: Finish

Design Back

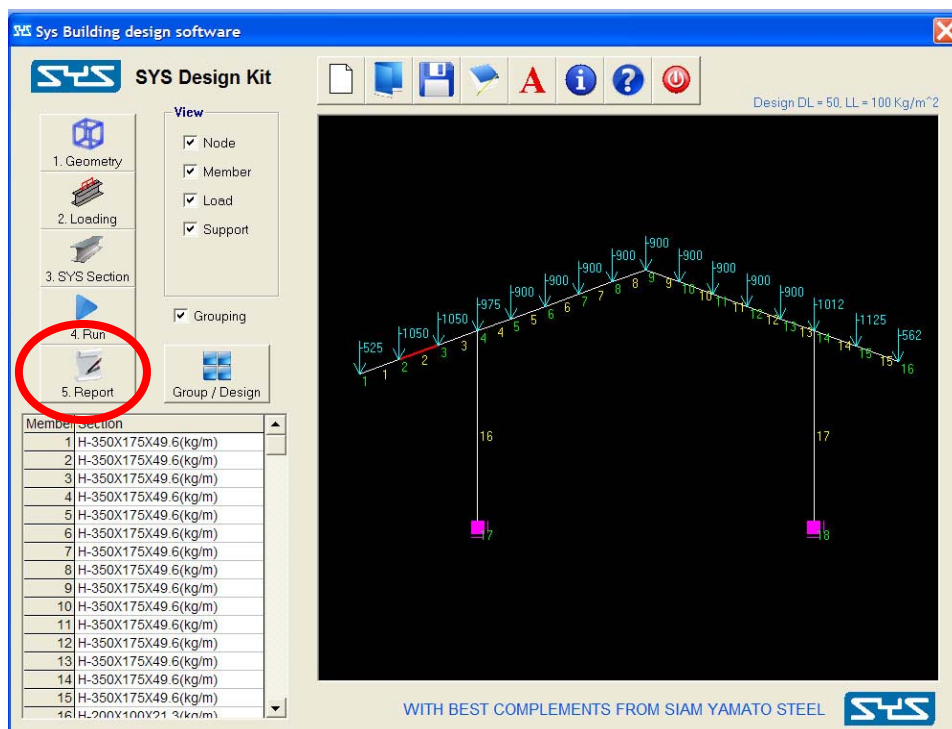
10) The design member sections are shown member-section table.



- 11) In practice, the beam section along frame length should be the same section for each member. Group for each type of member can selecting by checking in front of “Grouping” and clicking “Group/Design” button. User can edit member section for each member by double click at member section and change member section in the list.



- 12) Clicking “5.Report” to see member design section, summary of steel section, summary of steel weight and save data to database.



Report

Design

Member	Section	Length
1	H-350X175X49.6 (kg/m)	1.26
2	H-350X175X49.6 (kg/m)	1.25
3	H-350X175X49.6 (kg/m)	1.26
4	H-350X175X49.6 (kg/m)	1.08
5	H-350X175X49.6 (kg/m)	1.08
6	H-350X175X49.6 (kg/m)	1.08
7	H-350X175X49.6 (kg/m)	1.08
8	H-350X175X49.6 (kg/m)	1.08
9	H-350X175X49.6 (kg/m)	1.08
10	H-350X175X49.6 (kg/m)	1.08
11	H-350X175X49.6 (kg/m)	1.08
12	H-350X175X49.6 (kg/m)	1.08
13	H-350X175X49.6 (kg/m)	1.08
14	H-350X175X49.6 (kg/m)	1.35
15	H-350X175X49.6 (kg/m)	1.35
16	H-200X100X21.3 (kg/m)	6.40
17	H-200X100X21.3 (kg/m)	6.40

Summary

No.	Section	Weight	Length	Sum (kg.)
1	H-200X100X21.3 (kg/m)	21.30	12.80	272.64
2	H-350X175X49.6 (kg/m)	49.60	17.27	856.59
Total				1129.23

Data Base

DataBase Name: Data Base Location:

Save Report As:

No. Sets:

- “Sort by Member” : Rearrange the design member table in left table by member number
- “Sort by Section” : Rearrange the design member table in left table by section of member
- “Data Base Location” : Select the location of data base to be saved
- “Data Base Name” : Name of data base to be saved
- “Save Report As” : Name of frame output to be saved
- “No. Sets” : Number set of frame in project

13) After clicking “Data Base” button, the summary of all frame section in database will show.

Data Base

No.	Truss	Section	Weight	L/Set	W/Set	No. Set	Length	Weight
1	T1	L-50X50X3.06(kg/m)	3.06	25.98	79.50	10	259.8	795
2	T1	L-60X60X4.55(kg/m)	4.55	1.27	5.78	10	12.7	57.8
3	T1	L-75X75X8.85(kg/m)	8.85	4.33	38.32	10	43.3	383.2
4	T1	H-150X100X21.1(kg/m)	21.10	6.78	143.06	10	67.8	1430.6
5	T1	H-200X200X49.9(kg/m)	49.90	5.67	282.93	10	56.7	2829.3
6	T2	L-50X50X3.06(kg/m)	3.06	25.98	79.50	5	129.9	397.5
7	T2	L-60X60X4.55(kg/m)	4.55	1.27	5.78	5	6.35	28.9
8	T2	L-75X75X8.85(kg/m)	8.85	4.33	38.32	5	21.65	191.6
9	T2	H-150X100X21.1(kg/m)	21.10	6.78	143.06	5	33.9	715.3
10	T2	H-200X200X49.9(kg/m)	49.90	5.67	282.93	5	28.35	1414.65
11	T1	T-75X100X10.55(kg/m)	10.55	109.76	1157.97	1	109.76	1157.97
12	T1	H-150X150X31.5(kg/m)	31.50	14.23	448.25	1	14.23	448.25
13	T1	T-75X100X10.55(kg/m)	10.55	83.39	879.76	1	83.39	879.76
14	T1	T-100X150X15.30(kg/m)	15.30	26.12	399.64	1	26.12	399.64

Summary

No.	Section	Length	Weight
1	H-150X100X21.1(kg/m)	101.70	2145.90
2	H-150X150X31.5(kg/m)	66.09	2081.85
3	H-200X200X49.9(kg/m)	85.05	4243.95
4	L-50X50X3.06(kg/m)	389.70	1192.50
5	L-60X60X4.55(kg/m)	19.05	86.70
6	L-75X75X8.85(kg/m)	64.95	574.80
7	T-100X150X15.30(kg/m)	101.08	1546.54
8	T-75X100X10.55(kg/m)	447.22	4718.17
Total			16590.41

DataBase Name:

Steel Floor Design

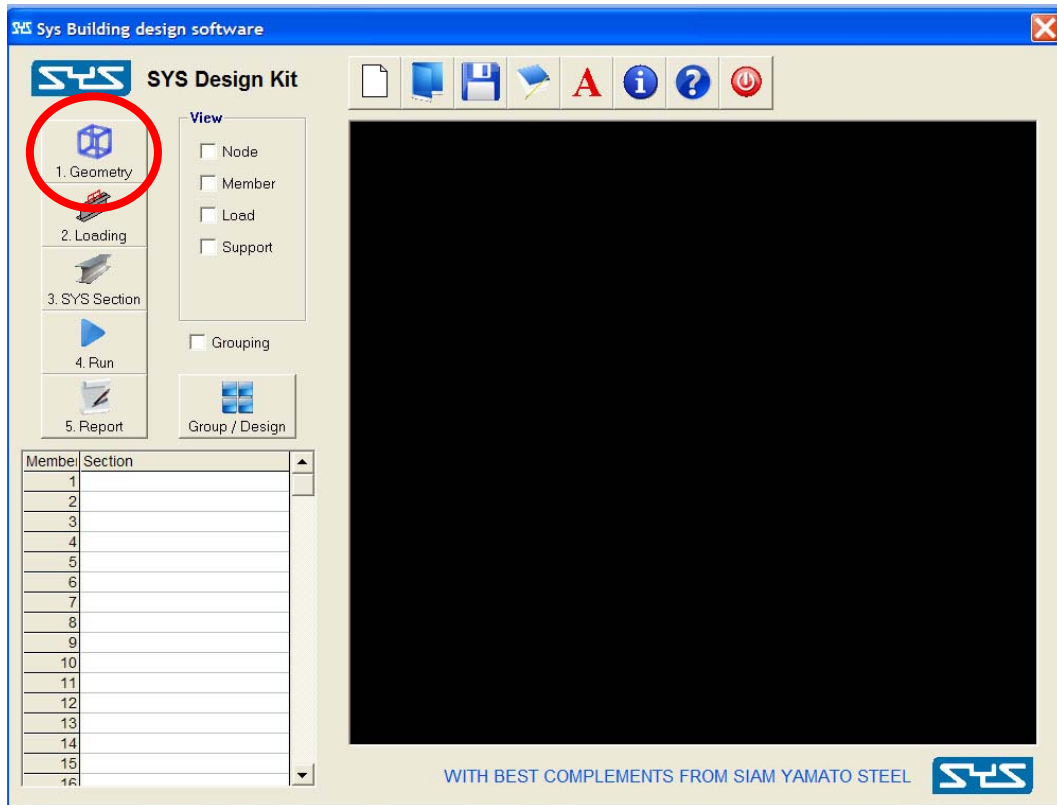
Steel floor design module provides the design of floor frame structure. All joints in model of floor are fixed joints. The dead load and live load are applied to frame member by uniform load along member. All members are carrying axial force, shear force and moment force from applied load. All information required for design such as floor geometry, support location, member section, type of slab design, dead load, live load and so on, shall be prepared and filled in the input box by users.

Input Mode

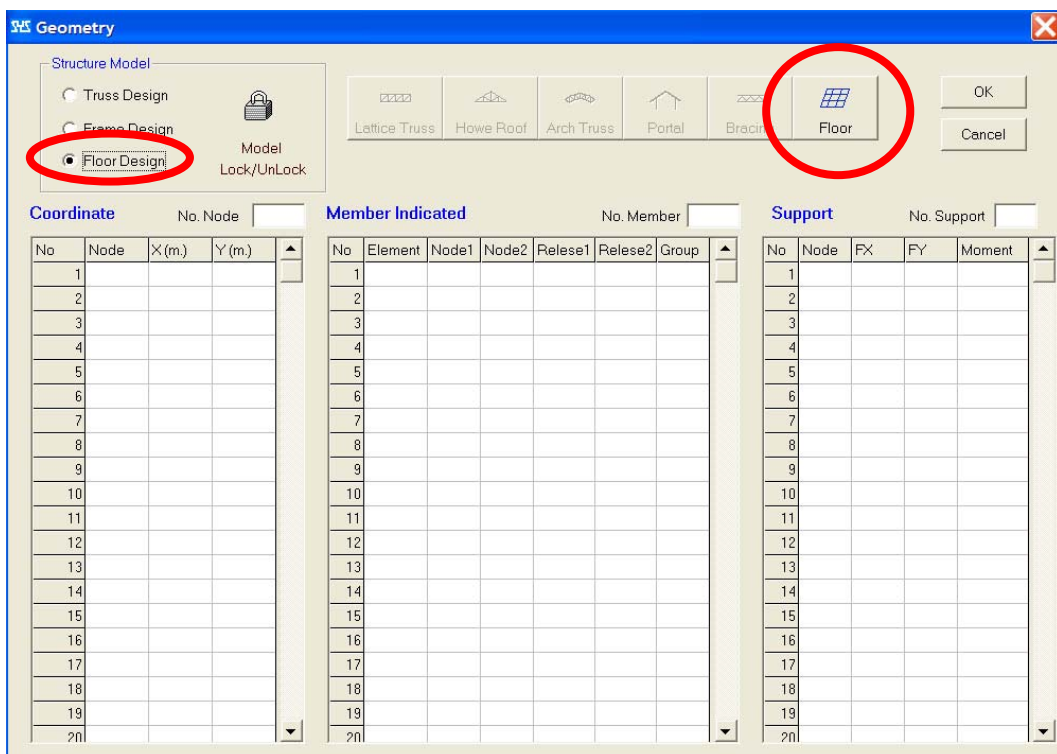


- 1) Steel floor design can be selected by clicking “Go to Program” and then clicking “OK”
- 2) Clicking “1.Geometry” button for input geometry of floor frame. In main menu page, there are “View” type for user to select display type of information in truss as described below

Node	:	Display node number of floor frame
Member	:	Display member number of floor frame
Load	:	Display load location, direction and magnitude
Support	:	Display support location



3) Clicking “Floor Design” and then select “Floor”.



4) For floor design, variables are required to be filled as follows

Length : Length of floor in meter
 No. Bay : Number of bay in length direction
 Width : Width of floor in meter
 No. Bay : Number of bay in width direction
 Apply to Floor Level : Number of floor structure
 Level Height : Height of floor level

Floor

Length m. Width m.
 No. Bay No. Bay

No	Length
1	2.67
2	2.67
3	2.67

No	Width
1	3.00
2	3.00
3	3.00

Apply to Floor Level To Level Height m.
 Floor DataBase

5) Then “Coordinate”, “Member indicated” and “Support” will be created in window and then clicking “OK” to go back to main menu. The user can edit any data of “Coordinate”, “Member indicated” and “Support” by double click and edit data in the window.

Geometry

Structure Model
☐ Truss Design
☐ Frame Design
☒ Floor Design

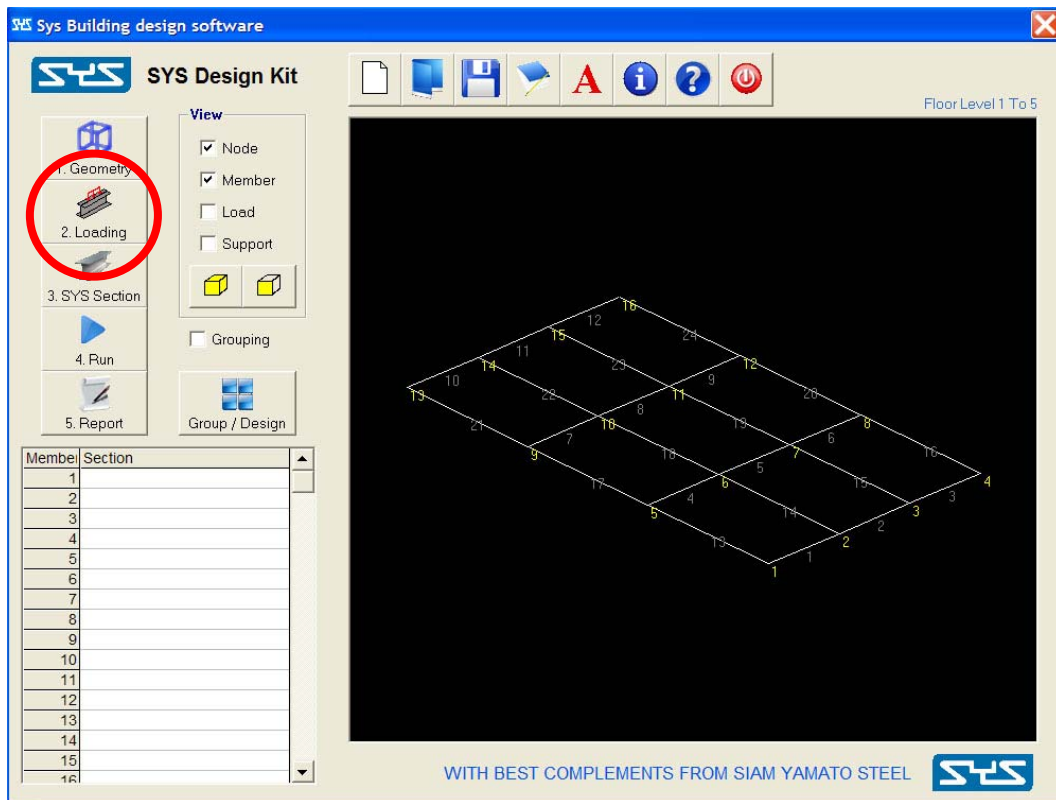
Coordinate No. Node **Member Indicated** No. Member **Support** No. Support

No	Node	X(m)	Y(m)
1	1	0.00	0.00
2	2	2.67	0.00
3	3	5.34	0.00
4	4	8.01	0.00
5	5	0.00	3.00
6	6	2.67	3.00
7	7	5.34	3.00
8	8	8.01	3.00
9	9	0.00	6.00
10	10	2.67	6.00
11	11	5.34	6.00
12	12	8.01	6.00
13	13	0.00	9.00
14	14	2.67	9.00
15	15	5.34	9.00
16	16	8.01	9.00

No	Element	Node1	Node2	Release1	Release2	Group
1	1	1	2			
2	2	2	3			
3	3	3	4			
4	4	5	6			
5	5	6	7			
6	6	7	8			
7	7	9	10			
8	8	10	11			
9	9	11	12			
10	10	13	14			
11	11	14	15			
12	12	15	16			
13	13	1	5			
14	14	2	6			
15	15	3	7			
16	16	4	8			
17	17	5	9			
18	18	6	10			
19	19	7	11			
20	20	8	12			

No	Node	FX	FY	Moment
1	1	1	1	0
2	2	1	1	0
3	3	1	1	0
4	4	1	1	0
5	5	1	1	0
6	6	1	1	0
7	7	1	1	0
8	8	1	1	0
9	9	1	1	0
10	10	1	1	0
11	11	1	1	0
12	12	1	1	0
13	13	1	1	0
14	14	1	1	0
15	15	1	1	0
16	16	1	1	0

- 6) Clicking “2.Loading” button in main menu to go to input load data.



- 7) Input floor dead load, live load, number of floor load, number of wall load, wall load, type of slab, direction of slab load in input table and click “Create Load” to create uniform load to beam frame. Variables are required to be filled as follows

No. Floor Load : Number of floor load
 Node 1 : First node number of floor load (shown in blue font)
 Node 2 : Second node number of floor load (shown in blue font)
 Node 3 : Third node number of floor load (shown in blue font)
 Node 4 : Fourth node number of floor load (shown in blue font)
 DL : Dead load in kilogram per square meter
 LL : Live load in kilogram per square meter
 No.way : Number of slab type (1 = one way, 2 = two way)
 Direction : Direction of one way slab (0= X-direction, 90= Y-direction)
 No. Wall Load : Number of wall load
 Member : Member number to applied wall load (shown in brown font)
 Weight : Weight of wall in kilogram per square meter
 Height : Height of wall in meter

Floor Loading

No. Floor Load: 5 No. Wall Load: 4 OK

No	Node1	Node2	Node3	Node4	DL	LL	No.Way	Direction	No	Member	Weight	Height
2	14	15	10	11	240	200	2	0	1			
3	15	16	11	12	300	220	2	0	2			
4	9	10	5	6	240	200	1	90	3			
5	5	6	1	2	222	300	1	0	4			

Unit
D.L.L.L = Kg/m²
Weight = Kg/m.

Create Load

Cancel

Member	Load
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	

Floor Loading

No. Floor Load: 5 No. Wall Load: 2 OK

No	Node1	Node2	Node3	Node4	DL	LL	No.Way	Direction	No	Member	Weight	Height
2	14	15	10	11	240	200	2	0	1	21	180	3
3	15	16	11	12	300	222	2	0	2	7	180	3
4	9	10	5	6	240	200	1	90				
5	5	6	1	2	222	300	1	0				

Unit
D.L.L.L = Kg/m²
Weight = Kg/m.

Create Load

Cancel

Member	Load
1	0
2	
3	
4	-660
5	
6	
7	-1200
8	-392
9	-465
10	0
11	-392
12	-465
13	-697
14	-697
15	
16	
17	0
18	0
19	
20	
21	-1127
22	-1019
23	-945
24	-513

Force

OK

No. Point Load

No. Uniform Load

No	Node	FX (kg.)	FY (kg.)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			

No	Member	W (kg/m)
1	4	-660
2	7	-1200
3	8	-392
4	9	-465
5	11	-392
6	12	-465
7	13	-697
8	14	-697
9	21	-1127
10	22	-1019
11	23	-660

- 8) Select “SYS Section” button to go to input steel section. User can select “H-Section”, “I-Section”, “Channels”, “Angles” and “Cut beam” from left column to “Attention Table” in the right column for program to use this section to design. More steel section from SYS are provided in program by clicking “Including Sub Series”. The sub series sections are not normal sections in the market. Please ask SYS for more information.

Select “Steel Grade” of member by clicking buttons in front of type of steel grade.

Sys Building design software

SYS Design Kit

View

☒ Node

☒ Member

☒ Load

☐ Support

☐ Grouping

Group / Design

1. Geometry

2. Loading

3. SYS Section

4. Run

5. Report

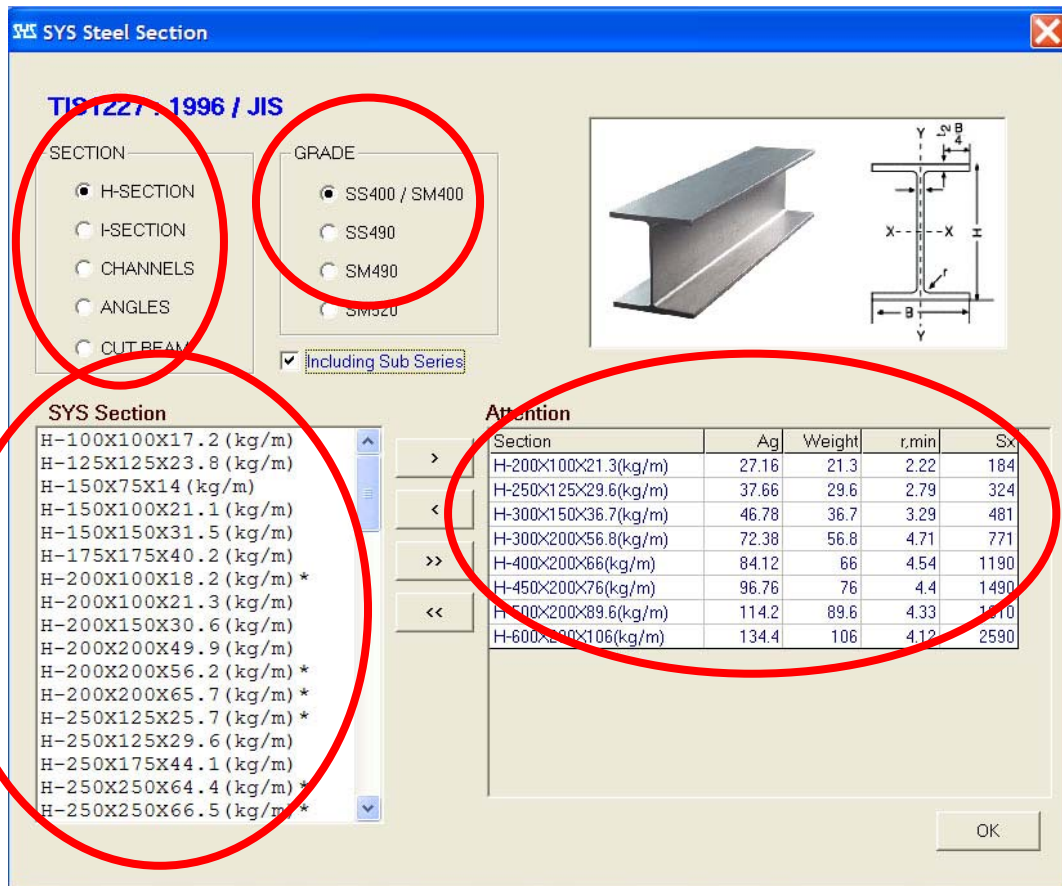
Member Section

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	

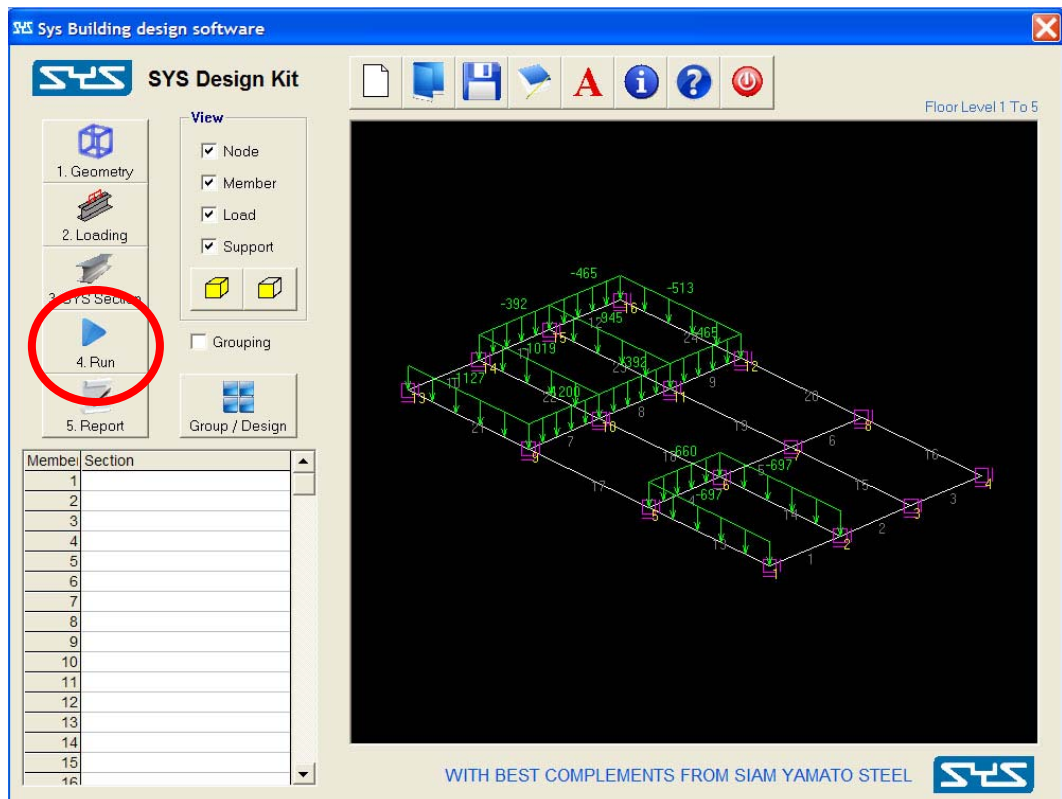
Floor Level 1 To 5

WITH BEST COMPLEMENTS FROM SIAM YAMATO STEEL

SYS



9) Run the program by clicking “4.Run” button.



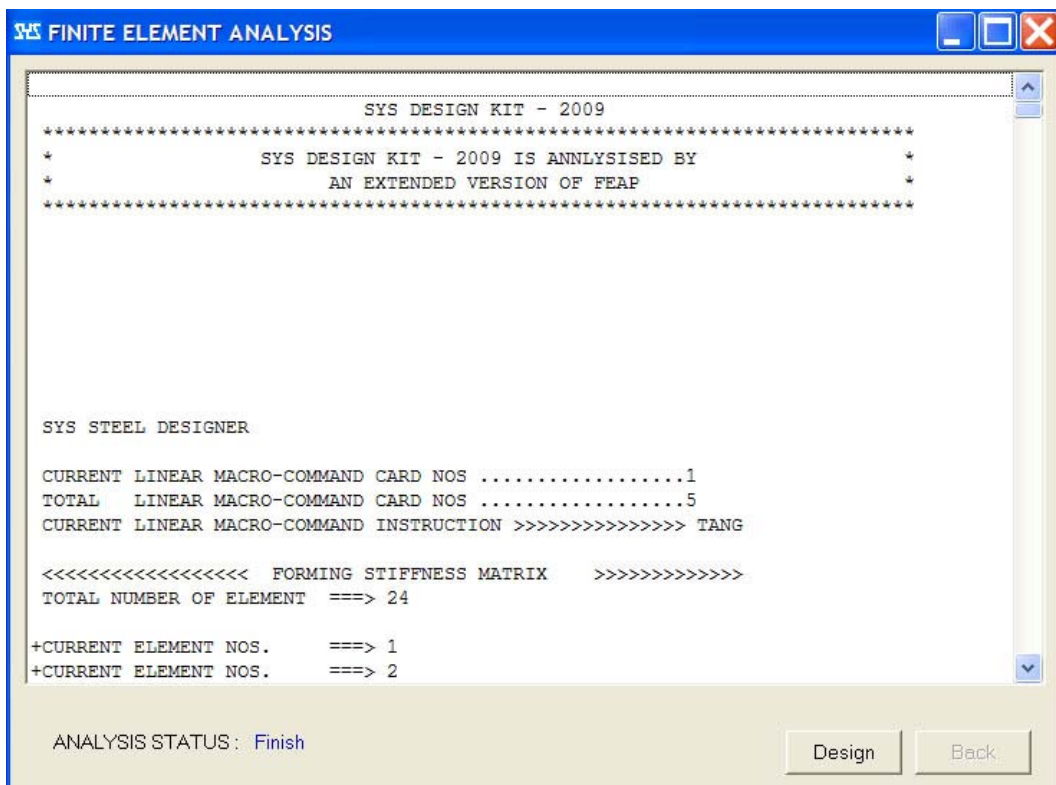
Result Mode

10) The design outputs are shown in figure. The information including analysis procedure, member axial force, member shear force, member torsion, member moment and design steel section.

The design checks are performed including the followings:

- Check for member axial force
- Check for member shear force
- Check for column axial force
- Check for column shear force
- Check for column moment force

The minimum section property in attention table will be checked for each member design. If the allowable design stress exceed the capacity stress, the stronger section property in attention table will be rechecked



FINITE ELEMENT ANALYSIS

Member	Node	Axial	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
1	NODE(1)	0.0000E+00	0.0000E+00	-2.2067E-05	1.4871E-06	6.2721E-05	0.0000E+00
	MIDSPAN					-3.3261E-05	0.0000E+00
	NODE(2)	0.0000E+00	0.0000E+00	2.2067E-05	-1.4871E-06	-3.8013E-06	0.0000E+00
2	NODE(2)	0.0000E+00	0.0000E+00	1.4237E-05	1.0659E-04	-3.6112E-05	0.0000E+00
	MIDSPAN					1.7106E-05	0.0000E+00
	NODE(3)	0.0000E+00	0.0000E+00	-1.4237E-05	-1.0659E-04	-1.9007E-06	0.0000E+00
3	NODE(3)	0.0000E+00	0.0000E+00	-2.8474E-06	5.9485E-06	1.3305E-05	0.0000E+00
	MIDSPAN					-9.5033E-06	0.0000E+00
	NODE(4)	0.0000E+00	0.0000E+00	2.8474E-06	-5.9485E-06	-5.7020E-06	0.0000E+00
4	NODE(5)	0.0000E+00	0.0000E+00	7.6362E+02	-2.9742E-06	-1.7546E-05	0.0000E+00
	MIDSPAN					-4.3130E+02	0.0000E+00
	NODE(6)	0.0000E+00	0.0000E+00	9.9858E+02	2.9742E-06	3.1367E+02	0.0000E+00
5	NODE(6)	0.0000E+00	0.0000E+00	1.4685E+02	-6.9220E-05	-3.1367E+02	0.0000E+00
	MIDSPAN					1.1763E+02	0.0000E+00
	NODE(7)	0.0000E+00	0.0000E+00	-1.4685E+02	6.9220E-05	-7.8418E+01	0.0000E+00
6	NODE(7)	0.0000E+00	0.0000E+00	-2.9370E+01	-1.1897E-05	7.8418E+01	0.0000E+00
	MIDSPAN					-3.9209E+01	0.0000E+00
	NODE(8)	0.0000E+00	0.0000E+00	2.9370E+01	1.1897E-05	-3.2994E-05	0.0000E+00
7	NODE(9)	0.0000E+00	0.0000E+00	1.3568E+03	1.0410E-05	-1.5921E-04	0.0000E+00
	MIDSPAN					-7.4194E+02	0.0000E+00
	NODE(10)	0.0000E+00	0.0000E+00	1.8472E+03	-1.0410E-05	6.5479E+02	0.0000E+00
8	NODE(10)	0.0000E+00	0.0000E+00	6.8686E+02	2.6327E-05	-6.5479E+02	0.0000E+00

ANALYSIS STATUS : Finish

Design Back

11) The design member sections are shown member-section table.

SYS Building design software

SYS Design Kit

View

- ☒ Node
- ☒ Member
- ☒ Load
- ☒ Support
- ☐ Grouping
- Group / Design

1. Geometry

2. Loading

3. SYS Section

4. Run

5. Report

Member Section

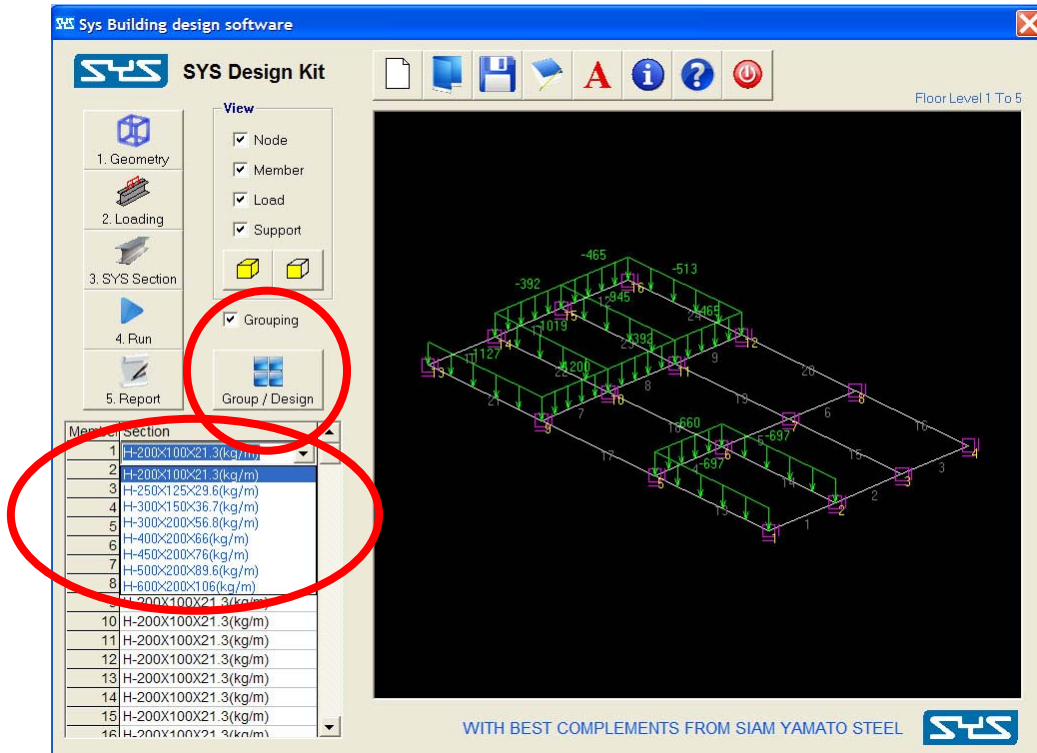
1	H-200X100X21.3(kg/m)
2	H-200X100X21.3(kg/m)
3	H-200X100X21.3(kg/m)
4	H-200X100X21.3(kg/m)
5	H-200X100X21.3(kg/m)
6	H-200X100X21.3(kg/m)
7	H-200X100X21.3(kg/m)
8	H-200X100X21.3(kg/m)
9	H-200X100X21.3(kg/m)
10	H-200X100X21.3(kg/m)
11	H-200X100X21.3(kg/m)
12	H-200X100X21.3(kg/m)
13	H-200X100X21.3(kg/m)
14	H-200X100X21.3(kg/m)
15	H-200X100X21.3(kg/m)
16	H-200X100X21.3(kg/m)

Floor Level 1 To 5

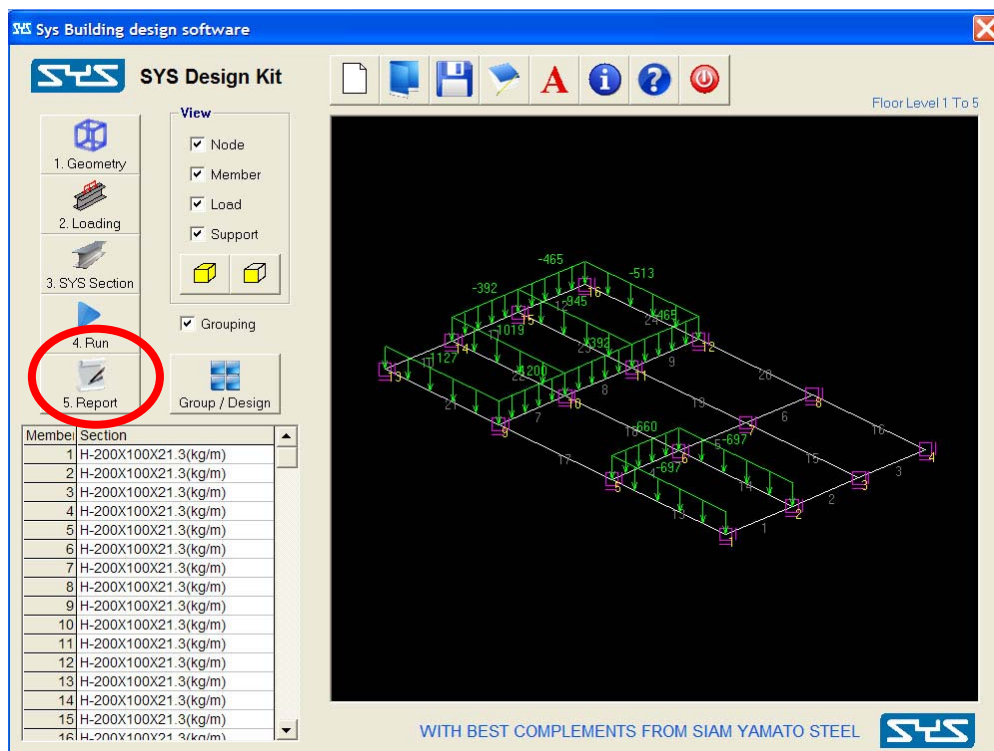
WITH BEST COMPLEMENTS FROM SIAM YAMATO STEEL

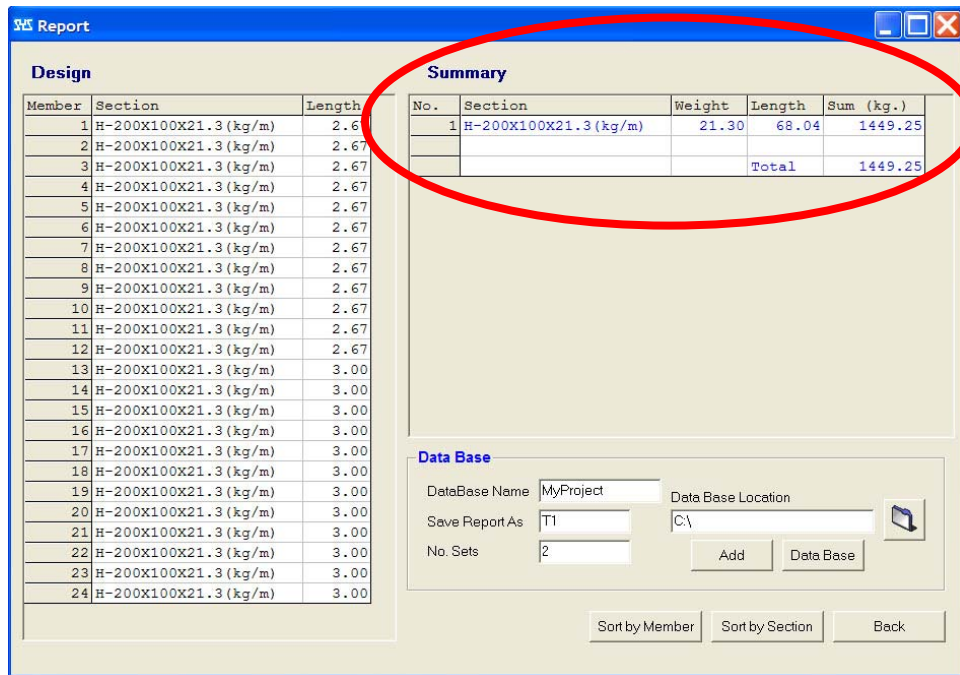
SYS

- 12) In practice, the beam section along frame length should be the same section for each member. Group for each type of member can selecting by checking in front of “Grouping” and clicking “Group/Design” button. User can edit member section for each member by double click at member section and change member section in the list.



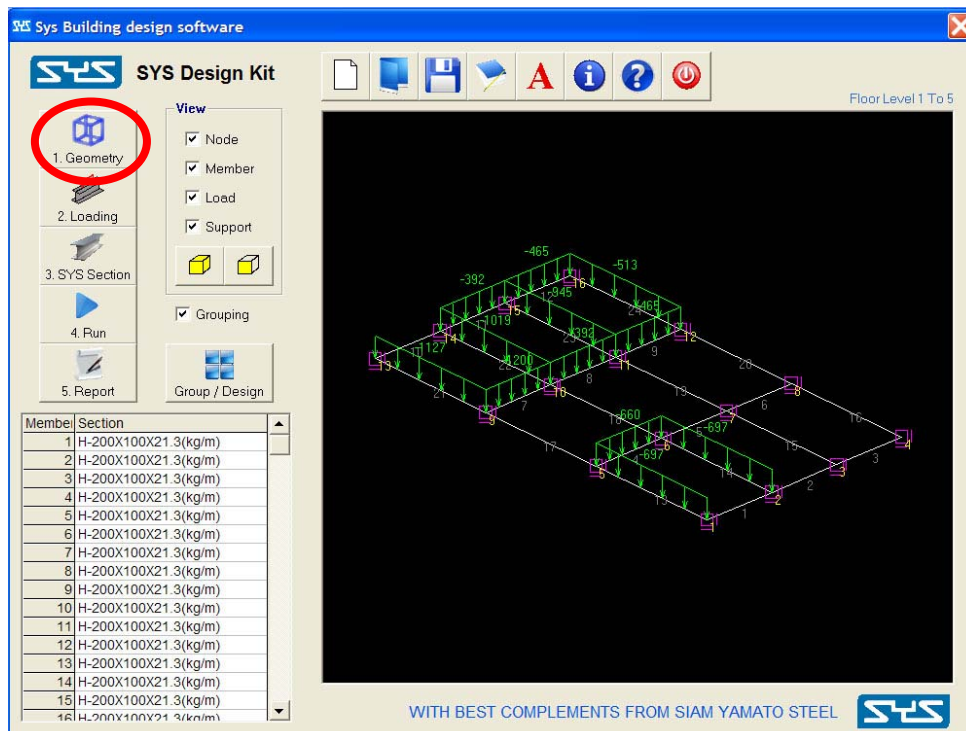
- 13) Clicking “5.Report” to see member design section, summary of steel section, summary of steel weight and save data to database.





- “Sort by Member” : Rearrange the design member table in left table by member number
- “Sort by Section” : Rearrange the design member table in left table by section of member
- “Data Base Location” : Select the location of data base to be saved
- “Data Base Name” : Name of data base to be saved
- “Save Report As” : Name of floor output to be saved
- “No. Sets” : Number set of floor in project

14) For column design, user has to go back to Floor input by click “1.Geometry”, click “Floor” and click “Column Design” in Floor input.



Geometry

Structure Model

☐ Truss Design
☐ Frame Design
☒ Floor Design

Model Lock/UnLock

☐ Lattice Truss
☐ Howe Roof
☐ Arch Truss
☐ Portal
☐ Bracing
☒ Floor

OK Cancel

Coordinate No. Node 16

No	Node	X(m)	Y(m)
1	1	0.00	0.00
2	2	2.67	0.00
3	3	5.34	0.00
4	4	8.01	0.00
5	5	0.00	3.00
6	6	2.67	3.00
7	7	5.34	3.00
8	8	8.01	3.00
9	9	0.00	6.00
10	10	2.67	6.00
11	11	5.34	6.00
12	12	8.01	6.00
13	13	0.00	9.00
14	14	2.67	9.00
15	15	5.34	9.00
16	16	8.01	9.00

Member Indicated No. Member 24

No	Element	Node1	Node2	Release1	Release2	Group
1	1	1	2			
2	2	2	3			
3	3	3	4			
4	4	4	5			
5	5	5	6			
6	6	6	7			
7	7	7	8			
8	8	8	9			
9	9	9	10			
10	10	10	11			
11	11	11	12			
12	12	12	13			
13	13	13	14			
14	14	14	15			
15	15	15	16			
16	16	16	1			
17	17	17	2			
18	18	18	3			
19	19	19	4			
20	20	20	5			

Support No. Support 16

No	Node	FX	FY	Moment
1	1	1	1	0
2	2	1	1	0
3	3	1	1	0
4	4	1	1	0
5	5	1	1	0
6	6	1	1	0
7	7	1	1	0
8	8	1	1	0
9	9	1	1	0
10	10	1	1	0
11	11	1	1	0
12	12	1	1	0
13	13	1	1	0
14	14	1	1	0
15	15	1	1	0
16	16	1	1	0

Floor

Length 8 m. Width 9 m.

No. Bay 3 No. Bay 3

Create

No	Length
1	2.67
2	2.67
3	2.67

No	Width
1	3.00
2	3.00
3	3.00

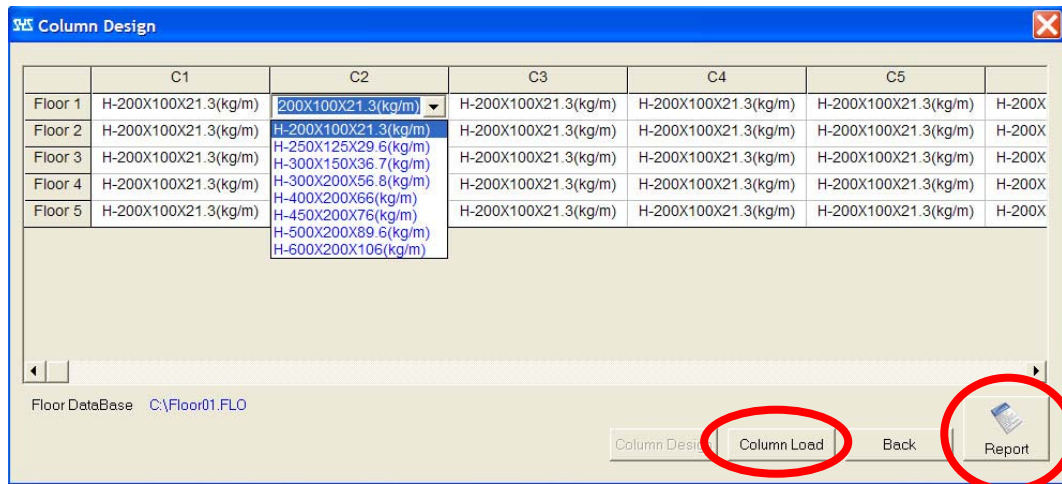
Apply Cancel

Apply to Floor Level 1 To 5 Level Height 3 m.

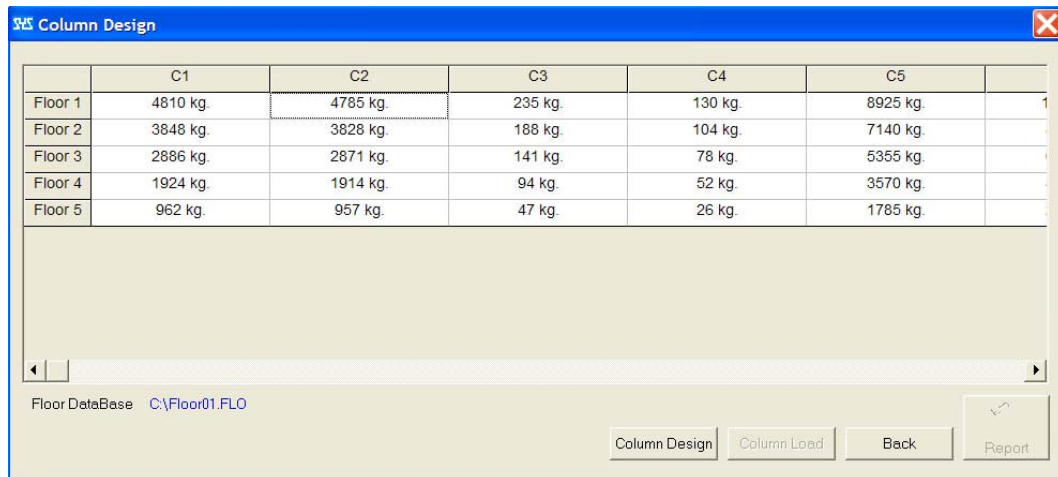
Floor DataBase C:\Floor01.FLO Reset

Column Design

- 15) The column design members will show in table. The vertical data in table shows the column number. The horizontal data in table shows the floor number of column. The user can edit member property of each member by click and edit data in table.



- 16) User can see column load by click “Column Load” button. Otherwise, click “Report” to see member design section, summary of column section, summary of steel weight and save data to database.



- “Sort by Member” : Rearrange the design member table in left table by member number
- “Sort by Section” : Rearrange the design member table in left table by section of member
- “Data Base Location” : Select the location of data base to be saved
- “Data Base Name” : Name of data base to be saved
- “Save Report As” : Name of floor column output to be saved
- “No. Sets” : Number set of floor column in project

Report

Design

Member	Section	Length
1-C01	H-200X100X21.3 (kg/m)	3.00
2-C02	H-200X100X21.3 (kg/m)	3.00
3-C03	H-200X100X21.3 (kg/m)	3.00
4-C04	H-200X100X21.3 (kg/m)	3.00
5-C05	H-200X100X21.3 (kg/m)	3.00
6-C06	H-200X100X21.3 (kg/m)	3.00
7-C07	H-200X100X21.3 (kg/m)	3.00
8-C08	H-200X100X21.3 (kg/m)	3.00
9-C09	H-250X125X29.6 (kg/m)	3.00
10-C10	H-250X125X29.6 (kg/m)	3.00
11-C11	H-200X100X21.3 (kg/m)	3.00
12-C12	H-200X100X21.3 (kg/m)	3.00
13-C13	H-200X100X21.3 (kg/m)	3.00
14-C14	H-200X100X21.3 (kg/m)	3.00
15-C15	H-200X100X21.3 (kg/m)	3.00
16-C16	H-200X100X21.3 (kg/m)	3.00
17-C01	H-200X100X21.3 (kg/m)	3.00
18-C02	H-200X100X21.3 (kg/m)	3.00
19-C03	H-200X100X21.3 (kg/m)	3.00
20-C04	H-200X100X21.3 (kg/m)	3.00
21-C05	H-200X100X21.3 (kg/m)	3.00
22-C06	H-200X100X21.3 (kg/m)	3.00
23-C07	H-200X100X21.3 (kg/m)	3.00
24-C08	H-200X100X21.3 (kg/m)	3.00
25-C09	H-200X100X21.3 (kg/m)	3.00
26-C10	H-250X125X29.6 (kg/m)	3.00

Summary

No.	Section	Weight	Length	Sum (kg.)
1	H-200X100X21.3 (kg/m)	21.30	231.00	4920.30
2	H-250X125X29.6 (kg/m)	29.60	9.00	266.40
Total				5186.70

Data Base

DataBase Name: Data Base Location:

Save Report As: No. Sets:

17) After clicking “Data Base” button, the summary of all floor member in database will show.

Data Base

No.	Truss	Section	Weight	L/Set	W/Set	No. Set	Length	Weight
1	T1	L-50X50X3.06(kg/m)	3.06	25.98	79.50	10	259.8	795
2	T1	L-60X60X4.55(kg/m)	4.55	1.27	5.78	10	12.7	57.8
3	T1	L-75X75X8.85(kg/m)	8.85	4.33	38.32	10	43.3	383.2
4	T1	H-150X100X21.1(kg/m)	21.10	6.78	143.06	10	67.8	1430.6
5	T1	H-200X200X49.9(kg/m)	49.90	5.67	282.93	10	56.7	2829.3
6	T2	L-50X50X3.06(kg/m)	3.06	25.98	79.50	5	129.9	397.5
7	T2	L-60X60X4.55(kg/m)	4.55	1.27	5.78	5	6.35	28.9
8	T2	L-75X75X8.85(kg/m)	8.85	4.33	38.32	5	21.65	191.6
9	T2	H-150X100X21.1(kg/m)	21.10	6.78	143.06	5	33.9	715.3
10	T2	H-200X200X49.9(kg/m)	49.90	5.67	282.93	5	28.35	1414.65
11	T1	T-75X100X10.55(kg/m)	10.55	109.76	1157.97	1	109.76	1157.97
12	T1	H-150X150X31.5(kg/m)	31.50	14.23	448.25	1	14.23	448.25
13	T1	T-75X100X10.55(kg/m)	10.55	83.39	879.76	1	83.39	879.76
14	T1	T-100X150X15.30(kg/m)	15.30	26.12	399.64	1	26.12	399.64

Summary

No.	Section	Length	Weight
1	H-150X100X21.1(kg/m)	101.70	2145.90
2	H-150X150X31.5(kg/m)	66.09	2081.85
3	H-200X200X49.9(kg/m)	85.05	4243.95
4	L-50X50X3.06(kg/m)	389.70	1192.50
5	L-60X60X4.55(kg/m)	19.05	86.70
6	L-75X75X8.85(kg/m)	64.95	574.80
7	T-100X150X15.30(kg/m)	101.08	1546.54
8	T-75X100X10.55(kg/m)	447.22	4718.17
Total			16590.41

DataBase Name: