AASHTOWare BrDR 7.5.0 Truss Tutorial T6 – Truss Cross Sections and Graphics

BrDR Tutorial

This example describes the definition of a Channelbox truss cross section with stacking plates on either side of channel webs and graphically viewing the truss cross sections.

Topics Covered

- Define Channelbox truss cross section with stacking plates on either side of channel webs
- View truss member cross section graphics from the Truss GUI
- LFR Analysis and Report

Define Channelbox truss cross section with stacking plates on either side of channel webs

From the **Bridge Explorer** double click on **BID 19 TrussTrainingExample** to open the bridge. Expand the **Pony Truss Example** superstructure definition, **TRUSSES**, and double click on the **Truss 1** node in the **Bridge Workspace** tree to open the **Truss** window as shown below.



Replace the commands for Section 2 with the lines below to define a Channelbox cross section with stacking plates on either side of channel webs.

								_	
ame: Truss	1			Link with:	None		\sim		
Description	Gusset plates	Specs	Factors						
Default ratin	ng method: LFR		~						
Truss "Left Unit Length ft Properties DefaultSyn DefaultStrn DefaultStrn DefaultEnc Riveted MaterialTyy Steel = "15 MemberCr ChannelBo TopFlangel 22.0 0.5 Channels" Connection Channels Channel	Truss" in UnitType US uctSteel "1905 to 193 Gonnection pe 005 to 1936 Steel" rossSection rx = Section1 Plate C 15x33.9" Outward n Riveted 0.0 tom x = Section2 C 15x33.9" Outward n Riveted 0.0 tom x = Section3 ate	36 Steel" d 13.125)						Î
RightWeb	Plate								



ChannelBox = Section2 TopFlangePlate 14.5 0.5 BottomFlangePlate 14.5 0.5 LeftWebPlate 15.0 0.75 RightWebPlate 15.0 0.75

LeftWebPlate2 9.0 0.375 7.5 1.0 RightWebPlate2 9.0 0.375 7.5 1.0 Channels "C 15x33.9" Inward 13.0 Connection Riveted 0.0

The Updated Truss window after replacing the Section 2 with the above Channelbox section is shown below.

Truss		-		×
ame: Truss 1	Link with: None 🗸			
Description Gusset plates Specs Factors				
Default rating method: LFR \checkmark				
22.0 0.5 Channels "C 15x33.9" Outward 13.125 Connection Riveted 0.0 Lacing Bottom ChannelBox = Section2 TopFlangePlate 14.5 0.5 BottomFlangePlate 14.5 0.5 LeftWebPlate 15.0 0.75 RightWebPlate 15.0 0.75 LeftWebPlate2 9.0 0.375 7.5 1.0 RightWebPlate2 9.0 0.375 7.5 1.0 Channels "C 15x33.9" Inward 13.0 Connection Riveted 0.0 ChannelBox = Section3				
LeftWebPlate 12.0 0.375 RightWebPlate 12.0 0.375				
Line number: 18				-
View member cross section Verify				
	OK Ap	ply	Cance	el

The commands "LeftWebPlate2" and "RightWebPlate2" allow defining stacking web plates on either side of the channel web in the channelbox truss cross sections.



Similarly, the same commands are available in the Anglebox command to define stacking web plates on either side of the angle legs.



Stacking Web Plates



For builtup sections, the "LeftWebPlate" and "RightWebPlate" commands are available to define stacking web plates on either side of main web plates.



Full I Section w/ Stacking Web Plates

Click **Verify** button to verify the truss input commands. Below are the results of the verification as displayed in the **Truss Command Verification** window.

Truss Command Verification	-		\times
Command verification			Î
Total number of messages: 9 Total number of information messages: 0 Total number of warning messages: 9 Total number of error messages: 0 Total number of validation messages: 0			
WARNING: ModelType command skipped			
WARNING: Unit\Force skipped			- 1
WARNING: DefaultMemConnection command skipped			- 1
WARNING: SectionType command skipped			- 1
WARNING: Symmetry command skipped			- 1
WARNING: MemberEccen command skipped			1
WARNING: PanelPointLoad command skipped			- 1
WARNING: AdditionalSelfLoad command skipped			1
WARNING: MemberOfInterest command skipped			- 1
Truss input verified Truss data validated			ļ
	Print	Clo	se

Close the Truss Command Verification window.

View truss member cross section graphics from Truss GUI and report

Click **View member cross section** button to open the window to generate the truss cross section graphics as shown below.

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er Cross Section X
Section name Member name
All Sections V LOL1 V
Generate Close
Þ

Select Section2 in the Section name drop down list.

🗛 View Me	mber Cross Section			×
View by:	O Section name		Member nar	ne
	Section2	~	LOL1	\sim
			Generate	Close

Click the **Generate** button. The graphical representation of **Section2** will be displayed as shown below.

Truss member name : Truss 1

Cross section name : Section2



Note:

1. Left web plates 2 are listed from left to right

2. Right web plates 2 are listed from right to left

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When **All Sections** in the **Section name** drop down list is selected, the graphic of each section will be displayed. Cross section graphics of a specific member can be generated by checking **Member Name** button, selecting the name of the member in the **Member name** drop down list and clicking **Generate** button.

Close the **View Member Cross Section** window. Click the **OK** button in **Truss** window to apply the change of the cross section 2.

LFR Analysis and Report

To perform a rating on **Truss 1**, select **Truss 1** in the **Bridge Workspace** tree and click the **Analysis Settings** button on the **Analysis** group of the **DESIGN/RATE** ribbon. The window shown below opens.

Bridge Workspace - TrussTrainingExample			ANALYSIS	REPORTS	?	—	\times
BRIDGE WORKSPACE	WORKSPACE TO	OLS VIEW	DESIGN/RATE	REPORTING			
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Analysis Analyze Analysis Settings Events	Tabular Specification Results Check Detail	on Engine Resu ail Outputs Gra	ults Save ph Results				
Analysis		Results					

Select the vehicle HS 20-44 under Inventory and Operating as shown below.

Design review Rating nalysis type: Line Girder ne / Impact loading type: As Requested Vehicles Output Engine Description Traffic direction: Both directions Vehicle selection Vehicle summary Image: Part of the selection Vehicle selection Image: Part of the selection Add to Image: Part of the selection Vehicle selection <	Analysis Settings					-	>
nalysis type:ine / Impact loading type: As Requested > Apply preference setting: None > Vehicles Output Engine Description Traffic direction: Both directions > Vehicle selection Vehicles Vehi	Design review O Rating	w O Rating Mating method:				~	
ne / Impact loading type: As Requested Apply preference setting: None Vehicles Output Engine Description Traffic direction: Both directions Vehicle selection Vehicles Standard FStandard	Inalysis type:	\sim					
Vehicles Output Engine Description Traffic direction: Both directions Vehicles Vehic	ane / Impact loading type: As Requested	\sim	Apply pref	erence setting:	None	~	
Traffic direction: Nethods Vehicle selection Vehicle summary Image: Standard Image: Standard	Vehicles Output Engine Description						
Vehicle selection Vehicle selection Vehicle summary Image: Standard image: Sta	Traffic direction: Both directions \sim		(Refresh	Temporary vehicles	Advanced	
 Vehicles Standard Alternate Military Loading -EV2 -EV3 -H 15-44 -H20-44 -H5 15-44 -H5 20-44 -Legal operating -Permit inventory -Permit inventory -Permit operating -SU5 -SU6 -SU6 -SU7 -Type 3-3 -Type 3-3	Vehicle selection		V	/ehicle summaŋ	/		
	 Standard -Alternate Military Loading -EV2 -EV3 -H 15-44 -H 20-44 -HS 20 (SI) -HS 20-44 -NRL -SU4 -SU4 -SU5 -SU6 -SU7 -Type 3 -Type 3-3 -Type 3S2 -Agency -User defined -Temporary 	Rem	Add to >> ove from <<	☐-Inventor -HS 2 ⊖ Operatir -HS 2 Legal op -Permit ir Permit o	y 0-44 19 0-44 berating twentory perating		

Click **OK** to apply the analysis settings and close the window.

Select **Truss 1** in the **Bridge Workspace** tree and click the **Analyze** button from the **Analysis** group of the **DESIGN/RATE** ribbon to perform the rating.

Bridge Workspace - TrussTrainingExample			ANALYSIS	REPORTS	?	_	\times
BRIDGE WORKSPACE	WORKSPACE	TOOLS VIEW	DESIGN/RAT	REPORTING			
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Analysis Analyze Analysis Settings Events	Tabular Specifica Results Check D	ation Engine Res Detail Outputs Gra	ults Save ph Results				
Analysis Results							

Engine Outputs

After the rating analysis is completed, the output files can be viewed by clicking the **Engine Outputs** button on the **Results** group of the ribbon.

Bridge Workspace - TrussTrainingExample			ANALYSIS	REPORTS	?	_	×
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A TrussTrainingExample				—		×	
	ile iruss_LFR .oad Analysis Report .oad FE Model Report ad FE Model Report Member Section Property I Results Report e iruss_LRFR	Report (Fri	day Jun. 23, 2023 1	5:26:43)			

The **Truss Member Section Property Report** contains data related to the computed and user input truss member section properties. A portion of the **Truss Member Section Property Report** is shown below.

Detailed Section Property Calculations

Member: L0L1 - ChannelBox Section



In the **Truss Member Section Property Report**, truss cross section graphics are displayed together with detailed section property calculations.