Rhino Beam Tools - User Manual

Introduction

Rhino Beam Tools is a plugin for Rhino 3D, designed to draw mechanical Beams and Nodes in context, then export them in a Beam calculation software. Currently, *RhinoBeamTools* is only compatible with ©Steel¹ (Editor: ®Bureau Veritas).

Plugin installation

Overview

The plugin installer can be downloaded at: https://www.tomkod.com/product/rhino-beam-tools/ A free trial is included, and yearly licenses can be purchased on the aforementioned page. *Rhino Beam Tools* works for Rhino 5², Rhino 6³, and Rhino7⁴.

Yak

Our plugins are also compatible with <u>Yak</u>, Rhino's new package manager ⁵⁾, which is basically an application store for Rhino. You just need to call Rhino's command **_PackageManager**:

Last update:

> Package Manager × Online Installed tomkod AttributeAnalysis Name: v2.0.4-beta **AttributeAnalysis** Downloads: AttributeAnalysis is a tool designed to give you Author: Matthieu Arnold (TomKod) a fast Analysis of your rh... Installed: Version: 2.0.4-beta ~ v1.0.5-rc DrawUserTexts Date published: Jundi 14 décembre 2020 This plugin for Rhino6 brings several life changing https://www.tomkod.com/ tools for your 2D drawi... Url: product/attribute-analysis/ Description: v1.0.3-beta LightweightSurvey AttributeAnalysis is a tool designed to give you a This plugin for Rhino allows your technicians to fast Analysis of your rhino model attributes. Select conduct a vessel os full su... an attribute: all your objects will be colorized automatically and a color key table will be displayed. You will also be able to select objects by v1.1.0 attributes. MarineWeightSchedule The Marine Weight Schedule plugin for Rhino6 can generate a bill of masses ... v1.1.2 RhinoBeamTools Rhino Beam Tools is a rhino plugin built as a bridge Install between Rhino and spec... Uninstall ✓ Include pre-releases Close Help You can also install from the repository with the following command line:

"D:\Program Files\Rhino 6\System\Yak.exe" install 'PluginName'

If you add this in a batch file (*.bat) at windows startup, it is probably the best way to keep all your plugins up-to-date 😉



License activation

upuale: 2021/04/22 start:plugins:rhinobeamtools:rbt-usermanual https://wiki.tomkod.com/doku.php?id=start:plugins:rhinobeamtools:rbt-usermanual&rev=1619083411 11:23

Prerequisites

The free evaluation can be used once per computer, and requires network access to www.license.tomkod.com The license activation requires network access to www.tomkod.com

Please check your firewall in case of failure.

Activation form

The activation window automatically shows up when the plugin is loading and a valid license or trial is not registered. If you want to see, change or remove your license while the plugin is already loaded, you can use the Rhino commands **PluginName_License**.

Activation status is always visible on the upper right corner of the form, if the icon is green your plugin will be enabled:

\sim

Trial Tab

This first tab is dedicated to the trial requests. Your trial status is displayed, and the button is disabled if a trial is not available for your computer (Your trial has already been activated, or the server is unreachable)

TomKod license activation - Tab	ble 3.x	?	×
TomKod > Softwares for users, by users	Plugin Status Enabled - license is valid	0)
Free Trial License Commercial Lice Computer ID:	nse Details		
Reque	st Free evaluation (*)		
Status: Accepted (End date	a: 21/12/2020)		

Commercial Tab

This tab's two main buttons let you Check-out (Activate) or Check-in (Desactivate) your license from

our license server.

TomKod licens	e activation - Table	3.x		?	>
FomKod oftwares for use	rs, by users	Plugin Status Enabled - <mark>lic</mark> ense is	valid	Ø	
Free Trial License	Commercial License	e Details			
Email		com.			1
Product key	<u> </u>		-		
Activ	rate (Check-Out)	Des	activate (Ch	eck-in)	
Status: Dis	abled				
Enable floa	ating licenses (Affec	ts every TomKod pl	ugins)		
Use a license ce	ertificate				
Alter	native method for of void network activat	fline activation, usin ion issues, but the l	g a certificat icense won't	e file. be floating	
This can a					

When the checkbox "Enable floating licenses" is checked, every TomKod's plugin will try to deactivate the license automatically when closing (Making it available for another of your computers)

Finally, a license certificate (*.TkLic) can be selected at the bottom of this tab. It allows to activate a license offline, but the license won't be floating anymore. If you need one, contact us at https://www.tomkod.com/contact/

Toolbar

The toolbars for Rhino are always included in your plugins installation directory, or can be downloaded here.

You just have to drag/drop the file "Tomkod.rui" to a rhino window to install them.

Generalities

Definitions

Nodes

Nodes are custom points with translations and rotation constraints defined on the x, y & z axis. Every node in the model is identified by a unique number.

Beams

Beams are oriented lines located between two nodes ⁶). They are represented as an arrow and have an optional angle option. Every beam in the model is identified by a unique number.

Beams local axes

Each beam has an angle referred to as θ , and an associated system of local axes x, y, z defined as follows:

- O is the origin of the beam
- E is the end of the beam
- OX, OY, OZ are three axes passing through O and parallel respectively to the three global axes X, Y, Z
- x is the axis orientated from O to E
- OV is an axis :
 - perpendicular to x
 - $\circ\,$ contained in the plane x, OY
 - \circ oriented like OY (VOY angle >= 90°)
 - \circ But, if x is parallel to OY, then:
 - if x is orientated like OY, then OV is orientated in the opposite direction of OX
 - if x is orientated in the opposite direction of OY, then OV is orientated like OX
- y is the axis obtained by rotating OV clockwise with respect to x by an angle equal to θ (when $\theta = 0^{\circ}$, y is identical to OV)
- z is the axis perpendicular to x and y and forming with them a dextrose trihedron

These rules are designed to fit *Steel*'s requirements, thus they might be different when exporting to RDM6-7.

Sets

A set is a group of beams. It is mainly used to easily select beams together.

Interface

Panel

Rhino Beam Tools comes with a user panel to interact with your Beams, Nodes, and Sets. The panel display is refreshed in real-time. If you select a beam or a node in the model, the panel is automatically enabled and the appropriate tab is opened. The *Display* tab offers quick access to display settings.

Nodes Beams Sets Display	Nodes Beams Sets Display	Nodes Beams Sets Display	Nodes Beams Sets Display
Selected Nodes list: 60, 50 DOFs Trans. /x - free Trans. /y - free	Selected Beams list: 23 Definition First Node 61 Second Node 50	Sets of Beams Test1 Test2	 Beams display ✓ Enable oriented preview ✓ Enable local axes display
Irans, /z - free Rot. /x - various Rot. /y - various Rot. /z - various	Angle 90.00		Nodes display Enable annotations Show Nodes Labels Show onde constraints
 ○ Fixed ● Free ○ Spring ○ Forced 	Value: 90 Z Local Vector: 0;-9;18	Create Set	Text height 11.000
	Reverse Beams	Add beams to Set	Annotation colors:
		Remove Beams from Set	Fixed nodes
		Remove Set	Rotation-fixed nodes
			Translation-fixed nodes
			Free nodes
			Other nodes

Annotations

Rhino Beam Tools offer the possibility to display annotations in the model with every node's settings:



The content, size, offset and color of these annotations can be edited in the RhinoBeamTools' panel's *Display* tab. *Constraints* can be "Fixed", "Free", "TranslationFixed", "RotationFixed", or Custom.

Custom constraints are displayed like this: x, y & z values for translation (t), then x, y & z values for rotation (r).

The values can be 0=fixed , 1=free, 2=spring, 3=forced.

In the example above, the node #87 is rotation-Free, with translation-fixed on x, translation-spring on y, and translation-free on z

Display settings



The display settings can be edited from RhinoBeamTools' panel's *Display* tab. These settings are immediately applied when their values are changed and are saved in the plugin.



	Name	Description				
Beams display settingsEnable oriented previewShows or hides 3D H - shaped beams to make it easier to understand the beams' orientation.Beams display settingsEnable local beams or hides the beams' local x w for axis, taking into local x w for axis, taking into		Nodes	Beams	Sets	Display	
settings	Enable local axis	Shows or hides the beams' local x, y & z axis, taking into account the beams' angle values.	Beams	s displaș ible orie ible loca	y ented prev al axes dis	view splay
	Enable annotations	Shows or hides the nodes annotations.	Nodes	s display	/	
Nodes	Show nodes labels	If enabled, the nodes annotations content will include the nodes' labels. (IDs)	Ena	ible ann ow Node ow node	otations es Labels e constrain	nts
	Show nodes constraints	If enabled, the nodes annotations content will include the nodes' constraints.	Text h	eight 1 ffset -	1.000 16 prs:	4 •
display settings	Text height	Sets the nodes annotations' display height. If too small this option might be ignored.	Fixed (nodes on-fixed	d nodes	
	Text offset	Sets the nodes annotations' display offset. The offset is oriented in the screen vertical direction.	Transla Free n	ation-fi: odes	ked node:	5
	Annotation colors	Clicking on these buttons opens a dialog form to set custom display colors for particular node constraints.	Other	nodes		

Toolbar

A toolbar is included in Tomkod's toolbar group, with buttons available for most commands:



Commands

RBT_About

This command can be used only from the command line prompt. It displays the plugin's current revision and license status.

L About			×
RhinoBeamToolsRH6 - v1.0.6.0			^
Commercial Name: Rhino Beam Tools 1.x Update Status: Rhino Beam Tools 1.x: Your current version (1.0.6.0 Editor: TomKod Copyright: Copyright ©Ship-ST 2020	i) is an early release candid	ate. Latest stable vi	ersion: 1.0.6
License status: License status unknown (Not implemented yet.) Computer ID:			
CHANGELOG:			
······			
v1.0.6 (14-10-2020)			
Fixed: When a model contains Rhino Beams or nodes, any item se	lected would bring to fron	t the RBT_Panel	- 1
l 15 available commands:			
TK_SetLicenseMode			
DOT AL			
KB1_About			
RBT_AddBeam			
RBT_AddBeam RBT_AddNode			
RBT_AddBeam RBT_AddBeam RBT_AddNode RRT DiscosiateMode		-	¥

RBT_License

This command can be used only from the command line prompt. It displays the plugin's activation form.

See license_activation.

RBT_AddNode

Add Node This command adds a node to the model.

Walkthrough

- 1. Pick a location
- 2. The node is created without constraints (Free)

Add Node 💦 İmport	Lines	🔀 Inter	rsect Bea	ams		
Duplicate node data		Merge Du	plicated	l Nodes	»	
	💌 Beam	Tools			(
	Nodes	Beams	Sets	Display		
	No Se	lected No	odes			
	DOFs					
	Trans	./x -				
	Trans	./y -				
	Rot.	/x -				
	Rot.	/y -				
	Rot.	/z -				

Options

No option available.

RBT_AddBeam

Add Beam This command adds a beam to the model.

- 1. Pick two nodes
- 2. The beam is created from the first node to the second node.

Command:			
🦯 Add Beam 🛛 🗆 A	dd Node 💦 🔭 Impor	t Lines 🛛 🔀 Intersect Beams	
💦 Dissociate Node 🛛	Duplicate node data	Merge Duplicated Nodes	»
Top •	Free	💌 BeamTools	-
	•	Nodes Beams Sets Display	
		No Selected Nodes	
Free	2	DOF	
•		DOFS	
		Trans. /x -	
		Trans. /z -	
		Rot. /x -	
,y		Rot. /y -	
		Rot. /z -	

Preselection

Preselection is allowed, but the nodes' order will be random. If more than two nodes were preselected, the beam will randomly be created between two nodes.

Options

No option available.

RBT_DissociateNode

Mode This command allows to separate two beams with a common node by duplicating the node.

- 1. Select the beam that should be dissociated (The one that will be linked to a new node)
- 2. Select which node should be dissociated: *StartNode* or *EndNode*
- 3. Choose if the node constraints should be duplicated ⁷). If *No* is selected, the new node will be unconstrained (Free).
- 4. Pick the new node location

2024/05/02 17:50 11/19 Rhino Beam Tools - User Manual Command: 🚴 Import Lines Add Beam Add Node 🎸 Intersect Beams Duplicate node data Dissociate Node Merge Duplicated Nodes » Top 🖣 BeamTools Nodes Beams Sets Display No Selected Nodes 2 DOFs-Free Trans. /x -Trans. /y -Trans. /z -Rot. /x -Rot. /y -Free Rot. /z -

Preselection

Preselection is allowed if only one beam is preselected

Options

- StartNode or EndNode
- Duplicate the node constraints

RBT_ImportLines

Import Lines This command can convert lines and curves into beams and nodes.

- 1. Select the line and curves that should be imported
- 2. Choose if the original lines should be removed
- 3. For each non-linear curve, a segment count option is shown to split the curve into several lines. The current view is zoomed in and the current curve is highlighted.
- 4. Every beam and node is created, duplicated nodes are removed and intersecting beams are split.

Command:	 ✓ ↓
Standard CPlanes Set View Display Viewport Layout Visibility Tran	sform / Curve Tools / Surface Tools / Solid Tools / RhinoBeamTool »
Add Beam 🛛 Add Node 🚴 Import Lines 🔀 Intersect Beams	K Dissociate Node
Merge Duplicated Nodes Keverse Beam SETS Sets manager	nnotations Settings 111 Show annotations CRefresh >>
Perspective +	 Bea Prop Ren Layers Help Nodes Beams Sets No Selected Nodes DOFs Trans./x - Trans./z - Trans./z - Rot. /x - Rot. /y - Rot. /y - Rot. /z - Fixed ○ Spring Free ○ Forced
Perspective Dessus Face Droite 🕸	
✓ End ☑ Near □ Point ☑ Mid □ Cen □ Int □ Perp ☑ Tan □ Quad □ Knot	Vertex Project Disable
Plane x -129.829 y 669.980 z 0.000 Millimeters Défaut	Grid Snap Ortho Planar Osnap SmartTrack Gumball Record Histor Filter

Preselection

Preselection is allowed.

Options

• *Delete original lines*: Select whether or not the original curves should be removed from the model upon completion.

RBT_IntersectBeams

Intersect Beams This commands check the whole model and adds node at beams intersections.

Walkthrough

Launch the command and that's it!



Options

No option available.

RBT_MergeDuplicateNodes

Merge Duplicated Nodes This command merge node with the same location.

Walkthrough

- 1. Set the tolerance (Default 0.001)
- 2. Every duplicated nodes are merged in the model

Options

• Tolerance : in model unit, maximum distance to consider two nodes duplicated.

RBT_Export



Exports your beams, nodes, and sets to ©Steel⁸⁾ or RDM7.

- 1. Launch the command
- 2. Select a file path and extension to export the model to ©Steel3 (*.*stw**), ©Steel4 (*.*steel**), or RDM6-7 (*.*por**)

3. The file is created, then RBT attempts to open it with Windows' default program for this extension.

Particularities of RDM6-7

RhinoBeamTools degrees of freedom and local axis orientation are based on Steel. To preserve as much as possible the model when exporting to RDM6-7, the following changes are applied to the exported file:

- RBT's local y axis is declared as RDM6-7 local Z axis
- The nodes constraints (DoF) are simplified, to keep only
 - Fixed on all DoF
 - $\circ\,$ Translation fixed / rotation free on all DoF
 - Fixed on all DoF except Z rotation
 - Fixed on all DoF except Y rotation



Scripted mode

No Scripted Mode

Options

No option available.

RBT_SetManager

This command⁹⁾ is a direct link to the *Rhino Beam Tools* panel's *Sets* tab

- 1. Launch the command
- 2. RhinoBeamTools' panel¹⁰ will be opened, with the *Sets* tab selected.

Sets of Beams Test1 Test2
Test1 Test2
Test2
Create Set
Demonso Cat
Rename Set
Add beams to Set
Remove Beams from Set
C 20
Remove Set

Options

No option available.

RBT_ReverseBeam

Severse Beam This command reverses the beam's first and second node.

- 1. Select the beams
- 2. The beams nodes are swapped. The arrows' orientations are refreshed as well as the nodes' info.



Preselection

Preselection is allowed, every selected beam will be reversed.

Options

No option available.

Alternative

A *"Reverse beam"* button is available on the panel's Beams tab. It does the same thing but does not allow to reverse several beams at the same time.

RBT_DuplicateNodeData

Duplicate node data This command copies a node's constraints to another.

- 1. Pick the original node to duplicate its constraints
- 2. Pick one or several nodes that need to be changed
- 3. The selected nodes are updated with the original node's constraints



Preselection

Preselection is enabled if one and only one node is preselected.

Options

No option available.

RBT_ShowAnnotations

111 Show annotations

Walkthrough

- 1. Launch the command.
- 2. If annotations were visible, they are hidden, if they were hidden they will be shown

OPT Annotations Settings	111 Show annotations 🛛 🥂 Refresh
	#2 (RotationFixed)
	#4 (t011.r111
#1 (Free)	#3 (TranslationFixed)

Options

No option available.

RBT_DisplaySettings



This command¹¹⁾ is a direct link to the panel's *Display* tab

Walkthrough

- 1. Launch the command
- 2. RhinoBeamTools' panel will be opened, with the *Display* tab selected. See interface for more details.

Nodes Beams Sets Display	
Beams display	
Enable oriented preview	
Enable local axes display	
Nodes display	
P Enable annotations	
Show Nodes Labels	
Show node constraints	
Text height 11.000	4
Text offset -16	\$
Annatation colors.	
Fixed nodes	
Rotation-fixed nodes	
Translation-fixed nodes	
Free nodes	

RBT_ImportSteel4File

This command is a beta prototype. It might have unwanted behaviors and we will decline any responsibility if it causes damages to your model. TomKod may or may not publish a proper version at a later date.

Attempts to import a Steel (*.steel) project beams' and nodes' in your Rhino models.

Walkthrough

- 1. Launch the command
- 2. Select the file to import
- 3. Nodes are imported with their contraints
- 4. Beams are imported

RBT_Refresh

C Refresh

This command forces a display update:

• Overlapped nodes are merged

- Beam errors are detected
- Beam positions are fixed
- Rhino views are redrawn

Normally you don't need to use this command.

Options

No option available.

1)

3)

4)

5)

6)

7)

v3 or v4

Rhino 5.12 or later

Rhino 6.15 or later

Tested up to Rhino 7.1

Rhino 6 or later only, with graphic user interface for Rhino7 only

More specifically, two nodes definition numbers

default value = true

8)

Bureau Veritas' beam calculation software

9) 11) ,

Formerly named RBT_AnnotationsSettings

¹⁰⁾ See interface

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Last update: 2021/04/22 11:23

