JumpingFrog|Robot

Communicate with Autodesk
Robot Structural Analysis

User manual for version 1.1

Written by weArk

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weArk SAS
128 rue de la Boétie 75008 PARIS
contact@we-ark.fr - www.we-ark.fr

1. Introduction to JumpingFrog|Robot

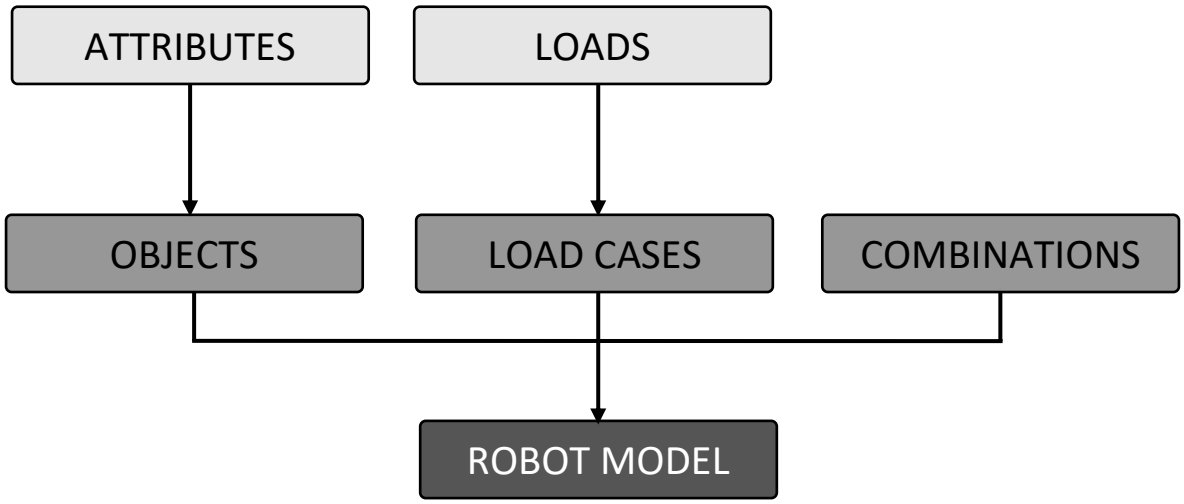
JumpingFrog is a Grasshopper plug-ins suite which allows you to import, export and manipulate structural design models, fabrication models of structural framings and others.

The purpose of the JumpingFrog|Robot plug-in is to create a two-way communication link between Rhinoceros software and Robot Structural Analysis.

1.1. General principle of a model construction

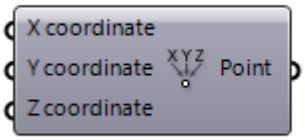
This plug-in was created to help users to build their Grasshopper definition the same way they would have made it in Robot manually. Each Grasshopper component represents an action in Robot.

Building a Robot model from Grasshopper can be summarized by the following diagram:

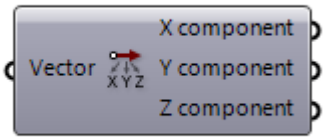


1.2.Construction / Deconstruction

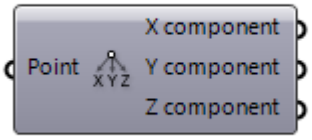
Most of creation components for native Grasshopper elements (Construct Point, Construct Vector, …) have their reciprocal components for deconstruction (Deconstruct Point, Deconstruct Vector, …).



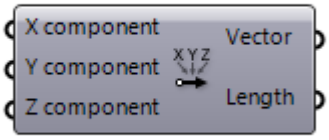
« Construct Point »



« Construct Vector »



« Deconstruct Point »

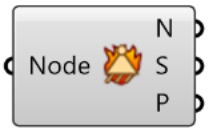


« Deconstruct Vector »

Using the same basic principle, JumpingFrog|Robot has for each component of construction a corresponding component of deconstruction. Thus, each object can be constructed, deconstructed and modified to be reconstructed.

Here is an example with the construction and deconstruction of a Robot node:

« Construct Point »

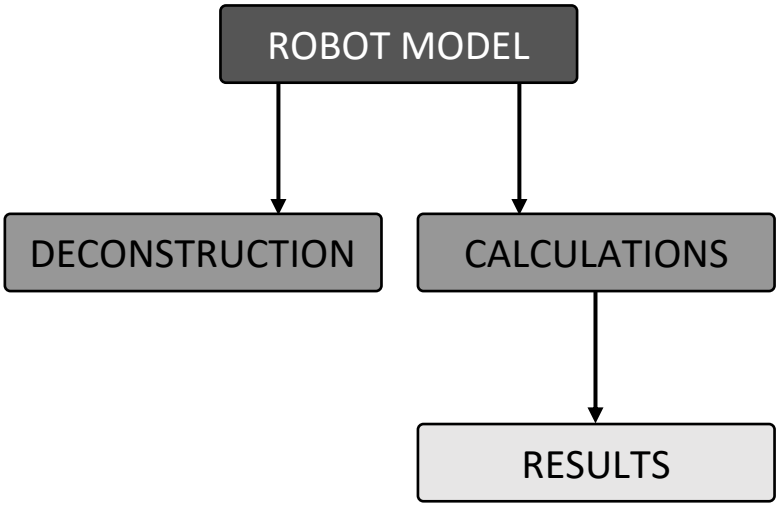


« Deconstruct Point »

1.3. Launch calculations from Grasshopper

In the same way that the user creates his model (as described in §1.1), he can also start the calculation and retrieve results without having to operate in the Robot software.

The launch of the calculation of a Robot model from Grasshopper and the recovery of the results can be summarized by the following diagram:



It is then possible to perform a calculation, then retrieve the results to reuse as input data of a new model, through the calculation of the model from Grasshopper and the deconstruction of the model and these elements. In steel construction, the camber calculation of a beam is a common application of this workflow.

1.4. Detailed features

This first commercial version allows the creation of the following elements:

- Materials (from catalog)
- Bar releases (rigid or elastic)
- Sections (standard, parametric or tapered)
- Supports (rigid or elastic)
- Surfaces (thickness and reinforcement)

- Nodal elements (nodes)
- Linear elements (bars or super-bars)
- Surface elements (claddings and panels)
- Inherited elements from surface elements (surface edges)

- Inertial loads (self-weight of elements)
- Node loads (nodal force, nodal displacement)
- Linear loads (dilatation, force, temperature, trapezoidal, uniform, uniform moment)
- Surface loads (3 points, linear 2 points, hydrostatic, temperature, uniform planar)
- Surface edges loads (3 points, uniform planar, linear on edge)

- Simple load cases (static analysis, buckling analysis)
- Load combinations (ELU, ELS, ELA)

This version also allows the calculation of the model and the recovery of the following elements:

- Nodal elements (displacements, strengths)
- Linear elements (displacements, strengths, stresses)

1.5. Special focus

- The units used by this plug-in are from the International System of Units. So geometrical elements (node coordinates, beam lines, cladding contours, section properties, and load displacement) have to be in meters, forces in N, pressure in N/m², angles in rad, …
- Every created element must have a robot number. You can set it yourself being careful that two different elements don't have the same number. If you put a negative number, the robot number will be set automatically (not for load cases and load combinations).

2. Composants d'attributs

2.1. Matériaux

Material Construct

Defines a material attribute from Robot database.

(1) Name [Text]: Material name in the database.

(2) Material [JFR_Material]: Material attribute.

Material Deconstruct

Deconstructs a material.

(1) Robot Material [JFR_Material]: Material attribute.

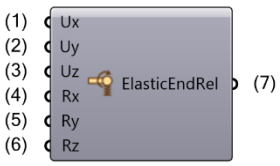
(2) Name [Text]: Name of the attribute.

(3) Material Name [Text]: Material name in the Robot database.

2.2. Relâchements

End Elastic Construct Release

Defines an elastic end bar release attribute by directly specifying its degrees of freedom.



(1) Ux [Number]: Translation along X. Negative number for blocked and positive number for elasticity.

(2) Uy [Number]: Translation along Y. Negative number for blocked and positive number for elasticity.

(3) Uz [Number]: Translation along Z. Negative number for blocked and positive number for elasticity.

(4) Rx [Number]: Rotation around X. Negative number for blocked and positive number for elasticity.

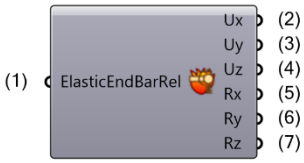
(5) Ry [Number]: Rotation around Y. Negative number for blocked and positive number for elasticity.

(6) Rz [Number]: Rotation around Z. Negative number for blocked and positive number for elasticity.

(7) Elastic End Release [JFR_EndRelease]: Elastic end release to construct releases.

End Elastic Deconstruct Release

Deconstructs Elastic end release attribute.



(1) Elastic End Bar Release [JFR_EndRelease]: Elastic End Bar Release

(2) Ux [Number]: Translation along X. Negative number for blocked, zero for free and positive number for elasticity.

(3) Uy [Number]: Translation along Y. Negative number for blocked, zero for free and positive number for elasticity.

(4) Uz [Number]: Translation along Z. Negative number for blocked, zero for free and positive number for elasticity.

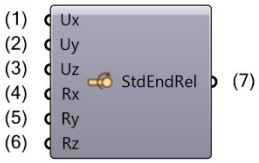
(5) Rx [Number]: Rotation around X. Negative number for blocked, zero for free and positive number for elasticity.

(6) Ry [Number]: Rotation around Y. Negative number for blocked, zero for free and positive number for elasticity.

(7) Rz [Number]: Rotation around Z. Negative number for blocked, zero for free and positive number for elasticity.

End Rigid Construct Release

Defines a rigid end bar release attribute by directly specifying its degrees of freedom.



(1) Ux [Boolean]: Translation along X. True for free and false for blocked.

(2) Uy [Boolean]: Translation along Y. True for free and false for blocked.

(3) Uz [Boolean]: Translation along Z. True for free and false for blocked.

(4) Rx [Boolean]: Rotation around X. True for free and false for blocked.

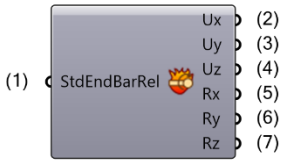
(5) Ry [Boolean]: Rotation around Y. True for free and false for blocked.

(6) Rz [Boolean]: Rotation around Z. True for free and false for blocked.

(7) Standard End Release [JFR_EndRelease]: Standard end release. To build releases.

End Rigid Deconstruct Release

Deconstructs rigid end release attribute.



(1) Standard End Bar Release [JFR_EndRelease]: Standard End Bar Release.

(2) Ux [Boolean]: Translation along X. True for free and false for blocked.

(3) Uy [Boolean]: Translation along Y. True for free and false for blocked.

(4) Uz [Boolean]: Translation along Z. True for free and false for blocked.

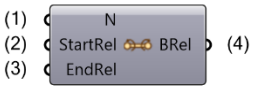
(5) Rx [Boolean]: Rotation around X. True for free and false for blocked.

(6) Ry [Boolean]: Rotation around Y. True for free and false for blocked.

(7) Rz [Boolean]: Rotation around Z. True for free and false for blocked.

Release Construct

Defines a bar release attribute from two end releases.



(1) Name [Text]: Name of the attribute (unique in the model).

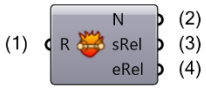
(2) Start Release [JFR_EndRelease]: Start release of the bar.

(3) End Release [JFR_EndRelease]: End release of the bar.

(4) Bar Release [JFR_BarRelease]: Bar Release attribute.

Release Deconstruct

Deconstructs release attribute.



(1) Release [JFR_BarRelease]: Release attribute of the bar element.

(2) Name [Text]: Name of the attribute.

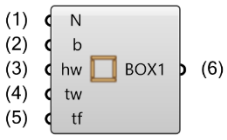
(3) Start release [JFR_EndRelease]: Start release of the bar.

(4) End release [JFR_EndRelease]: End release of the bar.

2.3. Sections

BOX Construct Section

Defines a box bar section attribute by directly specifying its dimensions.



(1) Name [Text]: Name of the attribute (unique in the model).

(2) Width (b) [Number]: Width of the section in m.

(3) Web height (hw) [Number]: Web height of the section in m.

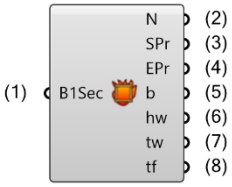
(4) Web thickness (tw) [Number]: Web thickness of the section in m.

(5) Flange thickness (tf) [Number]: Flange thickness of the section in m.

(6) Box1 section [JFR_BarSection]: Box section attribute.

BOX Deconstruct Section

Deconstructs a non-standard box1 section.



(1) Box1 Section [JFR_BarSection]: Non-standard box1 section.

(2) Name [Text]: Name of the attribute.

(3) Start Profile [Brep]: Brep representing the start profile of the section.

(4) End Profile [Brep]: Brep representing the end profile of the section.

(5) Width (b) [Number]: Width of the section in m.

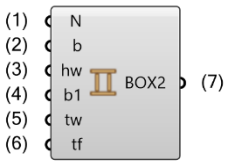
(6) Web height (hw) [Number]: Web height of the section in m.

(7) Web thickness (tw) [Number]: Web thickness of the section in m.

(8) Flange thickness (tf) [Number]: Flange thickness of the section in m.

BOX2 Construct Section

Defines a box2 bar section attribute by directly specifying its dimensions.



(1) Name [Text]: Name of the attribute (unique in the model).

(2) Width (b) [Number]: Width of the section in m.

(3) Web height (hw) [Number]: Web height of the section in m.

(4) Void width (b1) [Number]: Void width of the section in m.

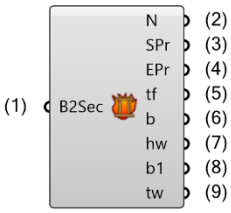
(5) Web thickness (tw) [Number]: Web thickness of the section in m.

(6) Flange thickness (tf) [Number]: Flange thickness of the section in m.

(7) Box2 section [JFR_BarSection]: Box2 section attribute.

BOX2 Deconstruct Section

Deconstructs a non-standard BOX2 section.



(1) Box2 Section [JFR_BarSection]: Non-standard box2 section.

(2) Name [Text]: Name of the attribute.

(3) Start Profile [Brep]: Brep representing the start profile of the section.

(4) End Profile [Brep]: Brep representing the end profile of the section.

(5) Flange thickness (tf) [Number]: Flange thickness of the section in m.

(6) Width (b) [Number]: Width of the section in m.

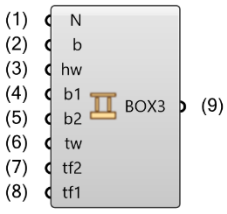
(7) Web height (hw) [Number]: Web height of the section in m.

(8) Void width (b1) [Number]: Void width of the section in m.

(9) Web thickness (tw) [Number]: Web thickness of the section in m.

BOX3 Construct Section

Defines a BOX3 bar section attribute by directly specifying its dimensions.



(1) Name [Text]: Name of the attribute (unique in the model).

(2) Lower flange width (b) [Number]: Lower flange width in m.

(3) Web height (hw) [Number]: Web height of the section in m.

(4) Void width (b1) [Number]: Void width of the section in m.

(5) Upper flange width (b2) [Number]: Upper flange width in m.

(6) Web thickness (tw) [Number]: Web thickness of the section in m.

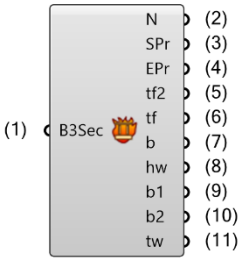
(7) Lower flange thickness (tf2) [Number]: Lower flange thickness in m.

(8) Upper flange thickness (tf1) [Number]: Upper flange thickness in m.

(9) Box3 section [JFR_BarSection]: Box3 section attribute.

BOX3 Deconstruct Section

Deconstructs a non-standard box3 section.



(1) Box3 Section [JFR_BarSection]: Non-standard box3 section.

(2) Name [Text]: Name of the attribute.

(3) Start Profile [Brep]: Brep representing the start profile of the section.

(4) End Profile [Brep]: Brep representing the end profile of the section.

(5) Upper flange thickness (tf) [Number]: Upper flange thickness of the section in m.

(6) Lower flange thickness (tf) [Number]: Lower flange thickness of the section in m.

(7) Width (b) [Number]: Width of the section in m.

(8) Web height (hw) [Number]: Web height of the section in m.

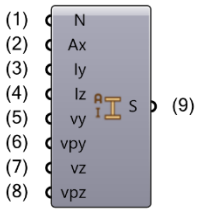
(9) Lower width (b1) [Number]: Lower width of the section in m.

(10) Upper width (b2) [Number]: Upper width of the section in m.

(11) Web thickness (tw) [Number]: Web thickness of the section in m.

ByChar Construct Section

Defines a bar section attribute by directly specifying its physical properties.



(1) **Name [Text:** Name of the attribute (unique in the model).

(2) **Ax [Number]:** Area of the section.

(3) **Iy [Number]:** Moment of inertia around the Y axis.

(4) **Iz [Number]:** Moment of inertia around the Z axis.

(5) **vy [Number]:** Positive distance of the most remote fibers measured with respect to the local Z axis.

(6) **vpy [Number]:** Negative distance of the most remote fibers measured with respect to the local Z axis.

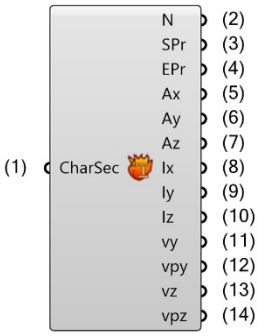
(7) **vz [Number]:** Positive distance of the most remote fibers measured with respect to the local Y axis.

(8) **vpz [Number]:** Negative distance of the most remote fibers measured with respect to the local Y axis.

(9) **Section [JFR_BarSection]:** Bar section attribute.

ByChar Deconstruct Section

Deconstructs a defined by characteristics section.



(1) ByChar Section [JFR_BarSection]: Defined by characteristics section.

(2) Name [Text]: Name of the attribute.

(3) Start Profile [Brep]: Brep representing the start profile of the section.

(4) End Profile [Brep]: Brep representing the end profile of the section.

(5) Ax [Number]: Section area.

(6) Ay [Number]: Shear rigidity factor on the y axis.

(7) Az [Number]: Shear rigidity factor on the z axis.

(8) Ix [Number]: Moment of inertia.

(9) Iy [Number]: Moment of inertia around the Y axis.

(10) Iz [Number]: Moment of inertia around the z axis.

(11) vy [Number]: Positive distance of the most remote fibers measured with respect to the local Z axis.

(12) vpy [Number]: Negative distance of the most remote fibers measured with respect to the local Z axis.

(13) vz [Number]: Positive distance of the most remote fibers measured with respect to the local Y axis.

(14) vpz [Number]: Negative distance of the most remote fibers measured with respect to the local Y axis.

Catalog Construct Section

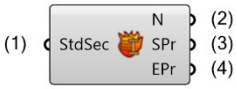
Defines a new section by loading it from the catalogue.

(1) Name [Text]: Name of the attribute (unique in the model).

(2) Std section [JFR_BarSection]: Standard section attribute.

Catalog Deconstruct Section

Deconstructs a standard section.



(1) Standard Section [JFR_BarSection]: Standard section from library.

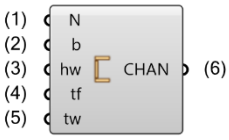
(2) Name [Text]: Name of the attribute.

(3) Start Profile [Brep]: Brep representing the start profile of the section.

(4) End Profile [Brep]: Brep representing the end profile of the section.

CHAN Construct Section

Defines a CHAN bar section attribute by directly specifying its dimensions.



(1) Name [Text]: Name of the attribute (unique in the model).

(2) Width (b) [Number]: Width of the section in m.

(3) Web height (hw) [Number]: Web height of the section in m.

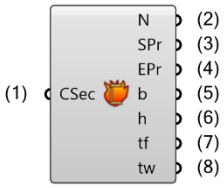
(4) Flange thickness (tf) [Number]: Flange thickness of the section in m.

(5) Web thickness (tw) [Number]: Web thickness of the section in m.

(6) Channel section [JFR_BarSection]: C section attribute.

CHAN Deconstruct Section

Deconstructs a non-standard channel section.



(1) Channel Section [JFR_BarSection]: Non-standard channel section.

(2) Name [Text]: Name of the attribute.

(3) Start Profile [Brep]: Brep representing the start profile of the section.

(4) End Profile [Brep]: Brep representing the end profile of the section.

(5) Width (b) [Number]: Width of the section in m.

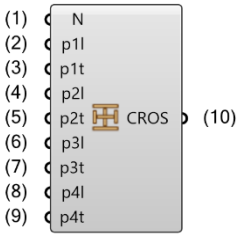
(6) Web height (h) [Number]: Web height of the section in m.

(7) Flange thickness (tf) [Number]: Flange thickness of the section in m.

(8) Web thickness (tw) [Number]: Web thickness of the section in m.

CROSS Construct Section

Defines a CROSS bar section attribute by directly specifying its dimensions.



(1) Name [Text]: Name of the attribute (unique in the model).

(2) p1l [Number]: Vertical flange length in m.

(3) p1t [Number]: Vertical flange thickness in m.

(4) p2l [Number]: Horizontal web length in m.

(5) p2t [Number]: Horizontal web thickness in m.

(6) p3l [Number]: Horizontal flange length in m (Careful this length is divided by 2).

(7) p3t [Number]: Horizontal flange thickness in m.

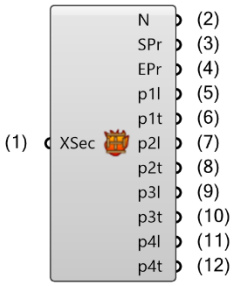
(8) p4l [Number]: Vertical web length in m.

(9) p4t [Number]: Vertical web thickness in m.

(10) Cross section [JFR_BarSection]: Cross section attribute.

CROSS Deconstruct Section

Deconstructs a non-standard cross section.



(1) Cross Section [JFR_BarSection]: Non-standard cross section.

(2) Name [Text]: Name of the attribute.

(3) Start Profile [Brep]: Brep representing the start profile of the section.

(4) End Profile [Brep]: Brep representing the end profile of the section.

(5) p1l [Number]: Vertical flange length in m.

(6) p1t [Number]: Vertical flange thickness in m.

(7) p2l [Number]: Horizontal web length in m.

(8) p2t [Number]: Horizontal web thickness in m.

(9) p3l [Number]: Horizontal flange length in m (Careful this length is divided by 2).

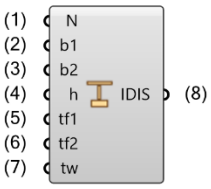
(10) p3t [Number]: Horizontal flange thickness in m.

(11) p4l [Number]: Vertical web length in m.

(12) p4t [Number]: Vertical web thickness in m.

IDIS Construct Section

Defines a disymmetrical I bar section attribute by directly specifying its dimensions.



(1) Name [Text]: Name of the attribute (unique in the model).

(2) Upper width (b1) [Number]: Upper width in m.

(3) Lower width (b2) [Number]: Lower width in m.

(4) Height (h) [Number]: Height of the section in m.

(5) Upper flange thickness (tf1) [Number]: Upper flange thickness in m.

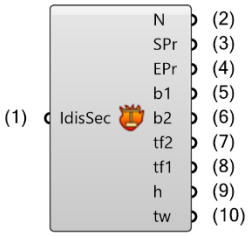
(6) Lower flange thickness (tf2) [Number]: Lower flange thickness in m.

(7) Web thickness (tw) [Number]: Web thickness of the section in m.

(8) Idis section [JFR_BarSection]: Disymmetrical I section attribute.

IDIS Deconstruct Section

Deconstructs a non-standard disymmetrical I section.



(1) Idis Section [JFR_BarSection]: Non-standard disymmetrical I section.

(2) Name [Text]: Name of the attribute.

(3) Start Profile [Brep]: Brep representing the start profile of the section.

(4) End Profile [Brep]: Brep representing the end profile of the section.

(5) Upper width (b1) [Number]: Upper width of the section in m.

(6) Lower width (b2) [Number]: Lower width of the section in m.

(7) Lower flange thickness (tf2) [Number]: Lower flange thickness of the section in m.

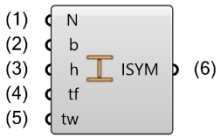
(8) Upper flange thickness (tf1) [Number]: Upper flange thickness of the section in m.

(9) Height (h) [Number]: Height of the section in m.

(10) Web thickness (tw) [Number]: Web thickness of the section in m.

ISYM Construct Section

Defines a symmetrical I bar section attribute by directly specifying its dimensions.



(1) Name [Text]: Name of the attribute (unique in the model).

(2) Width (b) [Number]: Width of the section in m.

(3) Height (h) [Number]: Height of the section in m.

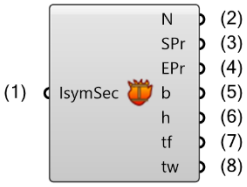
(4) Flange thickness (tf) [Number]: Flange thickness of the section in m.

(5) Web thickness (tw) [Number]: Web thickness of the section in m.

(6) Isym section [JFR_BarSection]: Symmetrical I section attribute.

ISYM Deconstruct Section

Deconstructs a non-standard symmetrical I section.



(1) Isym Section [JFR_BarSection]: Non-standard symmetrical I section.

(2) Name [Text]: Name of the attribute.

(3) Start Profile [Brep]: Brep representing the start profile of the section.

(4) End Profile [Brep]: Brep representing the end profile of the section.

(5) Width (b) [Number]: Width of the section in m.

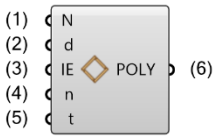
(6) Height (h) [Number]: Height of the section in m.

(7) Flange thickness (tf) [Number]: Flange thickness of the section in m.

(8) Web thickness (tw) [Number]: Web thickness of the section in m.

POLY Construct Section

Defines a polygonal bar section attribute by directly specifying its dimensions.



(1) Name [Text]: Name of the attribute (unique in the model).

(2) Diameter (d) [Number]: Diameter of the section in m.

(3) Int-Ext [Boolean]: Defines if the circle is interior or exterior. True: flat to flat / False: tip to tip.

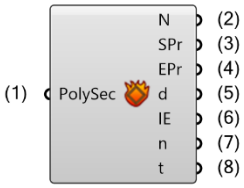
(4) Edges (n) [Integer]: Number of edges in the polygon.

(5) Thickness (t) [Number]: Thickness of the section in m. Must be zero for filled section.

(6) Polygonal section [JFR_BarSection]: Polygonal section attribute.

POLY Deconstruct Section

Deconstructs a non-standard polygonal section.



(1) Polygonal Section [JFR_BarSection]: Non-standard polygonal section.

(2) Name [Text]: Name of the attribute.

(3) Start Profile [Brep]: Brep representing the start profile of the section.

(4) End Profile [Brep]: Brep representing the end profile of the section.

(5) Diameter (d) [Number]: Diameter of the section in m.

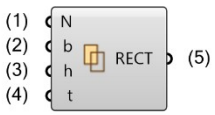
(6) IntExt [Boolean]: Defines if the circle is interior or exterior. True: flat to flat / False: tip to tip.

(7) Edges (n) [Integer]: Number of edges on the polygon.

(8) Thickness (t) [Number]: Thickness of the section in m.

RECT Construct Section

Defines a rectangular bar section attribute by directly specifying its dimensions.



(1) Name [Text]: Name of the attribute (unique in the model).

(2) Width (b) [Number]: Width of the section in m.

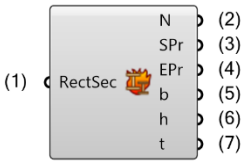
(3) Height (h) [Number]: Height of the section in m.

(4) Thickness (t) [Number]: Thickness of the section in m. Must be zero for filled section.

(5) Rectangular section [JFR_BarSection]: Rectangular section attribute.

RECT Deconstruct Section

Deconstructs a non-standard rectangular section.



(1) Rectangular Section [JFR_BarSection]: Non-standard rectangular section.

(2) Name [Text]: Name of the attribute.

(3) Start Profile [Brep]: Brep representing the start profile of the section.

(4) End Profile [Brep]: Brep representing the end profile of the section.

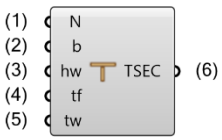
(5) Width (b) [Number]: Width of the section in m.

(6) Height (h) [Number]: Height of the section in m.

(7) Thickness (t) [Number]: Thickness of the section in m.

TSEC Construct Section

Defines a T bar section attribute by directly specifying its dimensions.



(1) Name [Text]: Name of the attribute (unique in the model).

(2) Width (b) [Number]: Width of the section in m.

(3) Web height (hw) [Number]: Web height of the section in m.

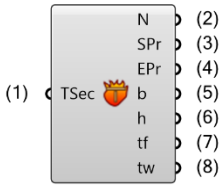
(4) Flange thickness (tf) [Number]: Flange thickness of the section in m.

(5) Web thickness (tw) [Number]: Web thickness of the section in m.

(6) Tsec section [JFR_BarSection]: T section attribute.

TSEC Deconstruct Section

Deconstructs a non-standard T section.



(1) T Section [JFR_BarSection]: Non-standard T section.

(2) Name [Text]: Name of the attribute.

(3) Start Profile [Brep]: Brep representing the start profile of the section.

(4) End Profile [Brep]: Brep representing the end profile of the section.

(5) Width (b) [Number]: Width of the section in m.

(6) Web height (h) [Number]: Web height of the section in m.

(7) Flange thickness (tf) [Number]: Flange thickness of the section in m.

(8) Web thickness (tw) [Number]: Web thickness of the section in m.

TUBE Construct Section

Defines a tube bar section attribute by directly specifying its dimensions.

(1) Name [Text]: Name of the attribute (unique in the model).

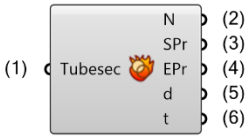
(2) Diameter (d) [Number]: Diameter of the section in m.

(3) Thickness (t) [Number]: Thickness of the section in m. Must be zero for filled section.

(4) Round section [JFR_BarSection]: Round section attribute.

TUBE Deconstruct Section

Deconstructs a non-standard tube section.



(1) Tube Section [JFR_BarSection]: Non-standard tube section.

(2) Name [Text]: Name of the attribute.

(3) Start Profile [Brep]: Brep representing the start profile of the section.

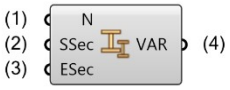
(4) End Profile [Brep]: Brep representing the end profile of the section.

(5) Diameter (d) [Number]: Diameter of the section in m.

(6) Thickness (t) [Number]: Thickness of the section in m.

Variable Construct Section

Defines a variable bar section from two non-standard sections of the same type.



(1) Name [Text]: Name of the attribute (unique in the model).

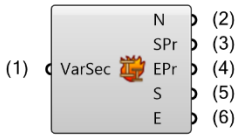
(2) Start section [JFR_BarSection]: Start section of the variable section.

(3) End section [JFR_BarSection]: End section of the variable section.

(4) Variable section [JFR_BarSection]: Variable section attribute.

Variable Deconstruct Section

Deconstructs a non-standard variable section.



(1) Variable Section [JFR_BarSection]: Non-standard variable section.

(2) Name [Text]: Name of the attribute.

(3) Start Profile [Brep]: Brep representing the start profile of the section.

(4) End Profile [Brep]: Brep representing the end profile of the section.

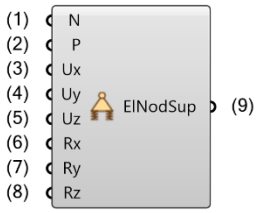
(5) Start Section [JFR_BarSection]: Start section of the variable section.

(6) End Section [JFR_BarSection]: End section of the variable section.

2.4. Appuis

Elastic Node Construct Support

Defines an elastic node support by defining its degrees of freedom and values of rigidity.



(1) Name [Text]: Name of the attribute (unique in the model).

(2) Local Plane [Plane]: Local plane, if not provided World XY is used.

(3) Ux [Number]: Translation along X. Negative number for blocked and positive number for elasticity.

(4) Uy [Number]: Translation along Y. Negative number for blocked and positive number for elasticity.

(5) Uz [Number]: Translation along Z. Negative number for blocked and positive number for elasticity.

(6) Rx [Number]: Rotation around X. Negative number for blocked and positive number for elasticity.

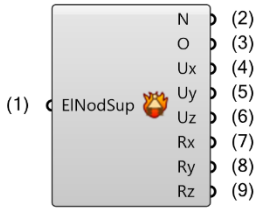
(7) Ry [Number]: Rotation around Y. Negative number for blocked and positive number for elasticity.

(8) Rz [Number]: Rotation around Z. Negative number for blocked and positive number for elasticity.

(9) Elastic Node Support [JFR_NodeSupport]: Elastic node support attribute.

Elastic Node Deconstruct Support

Deconstructs an elastic node support attribute.



(1) Elastic Node Support [JFR_NodeSupport]: Elastic Node Support.

(2) Name [Text]: Name of the attribute.

(3) Orientation [Plane]: Plane defining the local orientation of the node support.

(4) Ux [Number]: Translation along X (in N/m). Negative number for blocked, zero for free and positive number for elasticity.

(5) Uy [Number]: Translation along Y (in N/m). Negative number for blocked, zero for free and positive number for elasticity.

(6) Uz [Number]: Translation along Z (in N/m). Negative number for blocked, zero for free and positive number for elasticity.

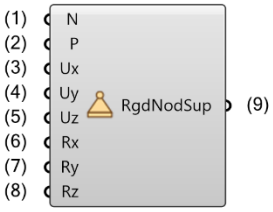
(7) Rx [Number]: Rotation around X (in N.m/rad). Negative number for blocked, zero for free and positive number for elasticity.

(8) Ry [Number]: Rotation around Y (in N.m/rad). Negative number for blocked, zero for free and positive number for elasticity.

(9) Rz [Number]: Rotation around Z (in N.m/rad). Negative number for blocked, zero for free and positive number for elasticity.

Rigid Node Construct Support

Constructs a rigid node support by defining its degrees of freedom.



(1) Name [Text]: Name of the attribute (unique in the model)

(2) Local Plane [Plane]: Local plane, if not provided World XY is used

(3) Ux [Boolean]: Translation along X. True for blocked and false for free.

(4) Uy [Boolean]: Translation along Y. True for blocked and false for free.

(5) Uz [Boolean]: Translation along Z. True for blocked and false for free.

(6) Rx [Boolean]: Rotation around X. True for blocked and false for free.

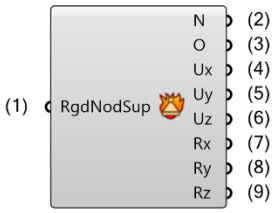
(7) Ry [Boolean]: Rotation around Y. True for blocked and false for free.

(8) Rz [Boolean]: Rotation around Z. True for blocked and false for free.

(9) Rigid Node Support [JFR_NodeSupport]: Rigid node support attribute.

Rigid Node Deconstruct Support

Deconstructs a rigid node support attribute.



(1) Rigid Node Support [JFR_NodeSupport]: Rigid node support.

(2) Name [Text]: Name of the attribute.

(3) Orientation [Plane]: Plane defining the local orientation of the node support.

(4) Ux [Boolean]: Translation along X. True for blocked and false for free.

(5) Uy [Boolean]: Translation along Y. True for blocked and false for free.

(6) Uz [Boolean]: Translation along Z. True for blocked and false for free.

(7) Rx [Boolean]: Rotation around X. True for blocked and false for free.

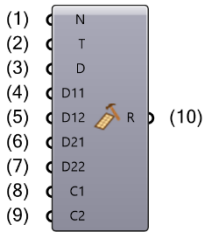
(8) Ry [Boolean]: Rotation around Y. True for blocked and false for free.

(9) Rz [Boolean]: Rotation around Z. True for blocked and false for free.

2.5. Panels

Construct Reinforcement

Creates reinforcement for panel element.



(1) Name [Text]: Name of the reinforcement of the panel.

(2) Type [Integer]: Type of the reinforcement calculation.

(3) Direction [Vector]: Main reinforcement direction of the panel element in global cartesian system. If nothing provided, robot automatic direction is applied.

(4) D11 [Number]: Dimension of the bottom bar D1 (Diameter 6, 8, 10, 12, 14, 16, 20, 25, 32, 40).

(5) D12 [Number]: Dimension of the top bar D1 (Diameter 6, 8, 10, 12, 14, 16, 20, 25, 32, 40).

(6) D21 [Number]: Dimension of the bottom bar D2 (Diameter 6, 8, 10, 12, 14, 16, 20, 25, 32, 40).

(7) D22 [Number]: Dimension of the top bar D2 (Diameter 6, 8, 10, 12, 14, 16, 20, 25, 32, 40).

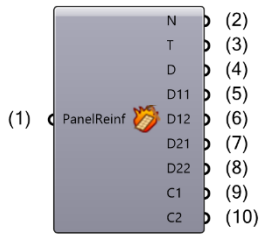
(8) C1 [Number]: Bottom cover C1.

(9) C2 [Number]: Top cover C2.

(10) Reinforcement [JFR_PanelReinforcement]: Reinforcement of the panel.

Deconstruct Reinforcement

Deconstructs a JumpingFrog Robot reinforcement for panel element.



(1) PanelReinforcement [JFR_PanelReinforcement]: Reinforcement of the panel.

(2) Name [Text]: Name of the reinforcement.

(3) Type [Integer]: Type of the reinforcement calculation.

(4) Direction [Vector]: Main reinforcement direction of the panel element in global cartesian system. If nothing provided, robot automatic direction is applied.

(5) D11 [Number]: Dimension of the bottom bar D1 (Diameter 6, 8, 10, 12, 14, 16, 20, 25, 32, 40).

(6) D12 [Number]: Dimension of the top bar D1 (Diameter 6, 8, 10, 12, 14, 16, 20, 25, 32, 40).

(7) D21 [Number]: Dimension of the bottom bar D2 (Diameter 6, 8, 10, 12, 14, 16, 20, 25, 32, 40).

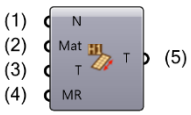
(8) D22 [Number]: Dimension of the top bar D2 (Diameter 6, 8, 10, 12, 14, 16, 20, 25, 32, 40).

(9) C1 [Number]: Bottom cover C1.

(10) C2 [Number]: Top cover C2.

Homogeneous 1 Construct Thickness

Creates homogeneous constant thickness for panel element.



(1) Name [Text]: Name of thickness.

(2) Material [JFR_Material]: Material of the panel.

(3) Thickness [Number]: Constant thickness value of the panel.

(4) Moment Reduction [Number]: Reduction of the moment of inertia of the panel.

(5) Thickness [JFR_PanelThickness]: Thickness H1 of the panel.

Homogeneous 1 Deconstruct Thickness

Deconstructs a JumpingFrog Robot homogeneous constant thickness for panel element.

(1) PanelThickness H1 [JFR_PanelThickness]: Thickness H1 of the panel.

(2) Name [Text]: Name of thickness.

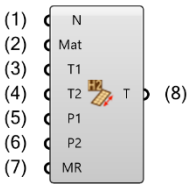
(3) Material [JFR_Material]: Material of the panel.

(4) Thickness [Number]: Constant thickness value of the panel.

(5) Moment Reduction [Number]: Reduction of the moment of inertia of the panel.

Homogeneous 2 Construct Thickness

Creates homogeneous double thickness for panel element.



(1) Name [Text]: Name of thickness.

(2) Material [JFR_Material]: Material of the panel.

(3) Thickness 1 [Number]: Thickness on point 1.

(4) Thickness 2 [Number]: Thickness on point 2.

(5) Point 1 [Point]: Point of the panel where the thickness 1 value is applied.

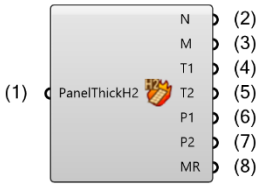
(6) Point 2 [Point]: Point of the panel where the thickness 2 value is applied.

(7) Moment Reduction [Number]: Reduction of the moment of inertia of the panel.

(8) Thickness [JFR_PanelThickness]: Thickness H2 of the panel.

Homogeneous 2 Deconstruct Thickness

Deconstructs a JumpingFrog Robot homogeneous double thickness for panel element.



(1) PanelThickness H2 [JFR_PanelThickness]: Thickness H2 of the panel.

(2) Name [Text]: Name of the thickness.

(3) Material [JFR_Material]: Material of the panel.

(4) Thickness 1 [Number]: Thickness on point 1.

(5) Thickness 2 [Number]: Thickness on point 2.

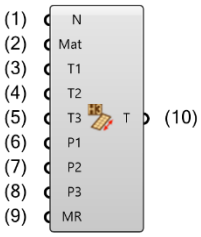
(6) Point 1 [Point]: Point of the panel where the thickness 1 value is applied.

(7) Point 2 [Point]: Point of the panel where the thickness 2 value is applied.

(8) Moment Reduction [Number]: Reduction of the moment of inertia of the panel.

Homogeneous 3 Construct Thickness

Creates homogeneous triple thickness for panel element.



(1) Name [Text]: Name of thickness.

(2) Material [JFR_Material]: Material of the panel.

(3) Thickness 1 [Number]: Thickness on point 1.

(4) Thickness 2 [Number]: Thickness on point 2.

(5) Thickness 3 [Number]: Thickness on point 3.

(6) Point 1 [Point]: Point of the panel where the thickness 1 value is applied.

(7) Point 2 [Point]: Point of the panel where the thickness 2 value is applied.

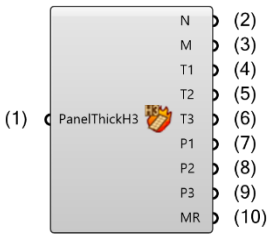
(8) Point 3 [Point]: Point of the panel where the thickness 3 value is applied.

(9) Moment Reduction [Number]: Reduction of the moment of inertia of the panel element.

(10) Thickness [JFR_PanelThickness]: Thickness of the panel.

Homogeneous 3 Deconstruct Thickness

Deconstructs a JumpingFrog Robot homogeneous triple thickness for panel element.



(1) PanelThickness H3 [JFR_PanelThickness]: Thickness H3 of the panel.

(2) Name [Text]: Name of the thickness.

(3) Material [JFR_Material]: Material of the panel.

(4) Thickness 1 [Number]: Thickness on point 1.

(5) Thickness 2 [Number]: Thickness on point 2.

(6) Thickness 3 [Number]: Thickness on point 3.

(7) Point 1 [Point]: Point of the panel where the thickness 1 value is applied.

(8) Point 2 [Point]: Point of the panel where the thickness 2 value is applied.

(9) Point 3 [Point]: Point of the panel where the thickness 3 value is applied.

(10) Moment Reduction [Number]: Reduction of the moment of inertia of the panel.

2.6. Utilitaires des attributs

End Releases Dispatcher

Dispatches end release attributes in their respective type.

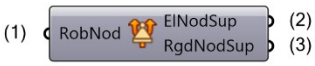
(1) Release [JFR_EndRelease]: End release attribute of the bar element.

(2) Elastic End Bar Release [JFR_EndRelease]: Elastic End Bar Release.

(3) Standard End Bar Release [JFR_EndRelease]: Standard End Bar Release.

Support Dispatcher

Dispatches support attributes in their respective type.



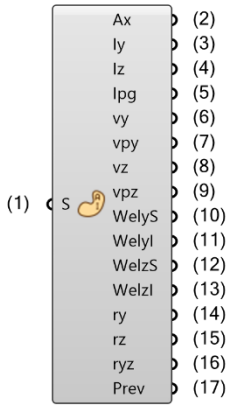
(1) Robot Node [JFR_NodeSupport]: Node support.

(2) Elastic Node Support [JFR_NodeSupport]: Elastic Node Support.

(3) Rigid Node Support [JFR_NodeSupport]: Rigid node support.

Evaluate Structural Informations

Get structural informations from a given surface. Surface must be drawn in XY plane. Informations are given in global coordinates. All output values are in Rhino units.



(1) Surface [Brep]: Surface to evaluate; Drawn in XY plane.

(2) Ax [Number]: Area of the section.

(3) Iy [Number]: Moment of inertia around the Y axis.

(4) Iz [Number]: Moment of inertia around the Z axis.

(5) Ipg [Number]: Polar Inertia around centroid.

(6) vy [Number]: Positive distance of the most remote fibers measured with respect to the local Z axis.

(7) vpy [Number]: Negative distance of the most remote fibers measured with respect to the local Z axis.

(8) vz [Number]: Positive distance of the most remote fibers measured with respect to the local Y axis.

(9) vpz [Number]: Negative distance of the most remote fibers measured with respect to the local Y axis.

(10) WelySup [Number]: Superior elastic modulus around Y.

(11) WelyInf [Number]: Inferior elastic modulus around Y.

(12) WelzSup [Number]: Superior elastic modulus around Z.

(13) WelzInf [Number]: Inferior elastic modulus around Z.

(14) ry [Number]: Raddius of gyration around Y.

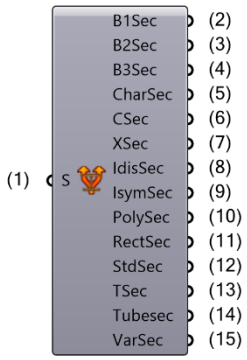
(15) rz [Number]: Raddius of gyration around Z.

(16) ryz [Number]: Polar raddius of gyration.

(17) Preview [Brep]: Preview.

Section Dispatcher

Dispatches section attributes in their respective type.



(1) Section [JFR_BarSection]: Section attribute of the bar element.

(2) Box1 Section [JFR_BarSection]: Non-standard box1 section.

(3) Box2 Section [JFR_BarSection]: Non-standard box2 section.

(4) Box3 Section [JFR_BarSection]: Non-standard box3 section.

(5) ByChar Section [JFR_BarSection]: Defined by characteristics section.

(6) Channel Section [JFR_BarSection]: Non-standard channel section.

(7) Cross Section [JFR_BarSection]: Non-standard cross section.

(8) Idis Section [JFR_BarSection]: Non-standard disymmetrical I section.

(9) Isym Section [JFR_BarSection]: Non-standard symmetrical I section.

(10) Polygonal Section [JFR_BarSection]: Non-standard polygonal section.

(11) Rectangular Section [JFR_BarSection]: Non-standard rectangular section.

(12) Standard Section [JFR_BarSection]: Standard section from library.

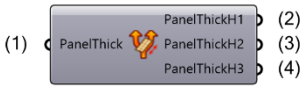
(13) T Section [JFR_BarSection]: Non-standard T section.

(14) Tube Section [JFR_BarSection]: Non-standard tube section.

(15) Variable Section [JFR_BarSection]: Non-standard variable section.

Thickness dispatcher

Dispatches thicknesses in their respective types.



(1) PanelThickness [JFR_PanelThickness]: JF Robot panel thickness.

(2) PanelThickness H1 [JFR_PanelThickness]: JF Robot panel thickness H1.

(3) PanelThickness H2 [JFR_PanelThickness]: JF Robot panel thickness H2.

(4) PanelThickness H3 [JFR_PanelThickness]: JF Robot panel thickness H3.

3. Objects

3.1. Nodal Objects

Create Node

Creates a Robot node element.

(1) Point [Point]: Point of the parameter.

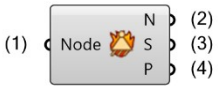
(2) RobotNumber [Integer]: Requested robot number for the node.

(3) Support [JFR_NodeSupport]: Support attribute of the robot node element.

(4) RobotNode [JFR_Node]: Created Robot node element.

Deconstruct Node

Deconstructs a JumpingFrog Robot node element.



(1) RobotNode [JFR_Node]: JF Robot node to deconstruct.

(2) RobotNumber [Integer]: Number of the element in the Robot model.

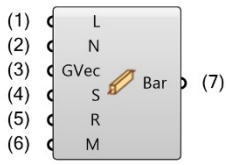
(3) Support [JFR_NodeSupport]: Support attribute of the node.

(4) Point [Point]: Geometrical location of the node.

3.2.Linear Objects

Create Bar

Creates a robot bar element.



(1) Line [Line]: Axis line of the new bar.

(2) RobotNumber [Integer]: Requested robot number for the bar.

(3) Gamma Vector [Vector]: Vector of the principal axis of the section of the bar.

(4) Section [JFR_BarSection]: Section attribute of the robot bar element.

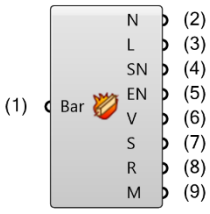
(5) Release [JFR_BarRelease]: Release attribute of the robot bar element.

(6) Material [JFR_Material]: Material attribute of the robot bar element.

(7) RobotBar [JFR_SimpleBar]: Simple bar element.

Deconstruct Bar

Deconstructs a Robot bar element.



(1) RobotBar [JFR_SimpleBar]: Simple bar element.

(2) RobotNumber [Integer]: Number of the element in the Robot model.

(3) Line [Line]: Axis line of the robot bar element.

(4) Start Node [JFR_Node]: Start node of the bar element.

(5) End Node [JFR_Node]: End node of the bar element.

(6) Gamma Vector [Vector]: Gamma vector of the bar element.

(7) Section [JFR_BarSection]: Section of the bar element.

(8) Release [JFR_BarRelease]: Releases of the bar element.

(9) Material [JFR_Material]: Material of the bar element.

Create Super Bar

Creates a Robot super bar element.

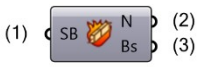
(1) Bars [JFR_SimpleBar]: Simple bars that will compound the superbar.

(2) RobotNumber [Integer]: Requested robot number for the bar.

(3) SuperBar [JFR_SuperBar]: Superbar compounded of the given bars.

Deconstruct Super Bar

Deconstructs a Robot super bar element.



(1) RobotSuperBar [JFR_SuperBar]: JF Robot super bar element to deconstruct.

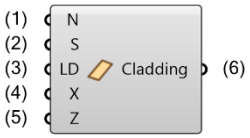
(2) RobotNumber [Integer]: Number of the element in the Robot model.

(3) Bars [JFR_SimpleBar]: List of simple bars representing the superbar.

3.3.Surfacic Objects

Create Cladding

Creates a Robot cladding element.



(1) RobotNumber [Integer]: Requested robot number for the cladding.

(2) Surface [Brep]: Planar surface with openings (if necessary).

(3) Load Distribution [Integer]: Load distribution of the cladding. 0 = XY, 1 = X, or 2 = Y.

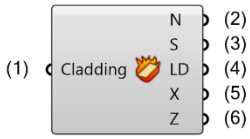
(4) X-Axis [Vector]: X-Axis of the local plane of the cladding.

(5) Reverse Z-Axis [Boolean]: Reverse the Z-Axis of the local plane of the cladding.

(6) RobotCladding [JFR_Cladding]: Cladding element.

Deconstruct Cladding

Deconstructs a JumpingFrog Robot cladding element.



(1) RobotCladding [JFR_Cladding]: Cladding element.

(2) RobotNumber [Integer]: Number of the element in the Robot model.

(3) Surface [Brep]: Planar surface with openings (if necessary).

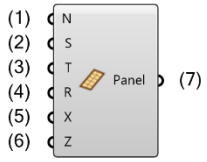
(4) Load Distribution [Integer]: Load distribution of the cladding. 0 = XY, 1 = X, or 2 = Y.

(5) X-Axis [Vector]: X-Axis of the local plane of the cladding.

(6) Reverse Z-Axis [Boolean]: Reverse the Z-Axis of the local plane of the cladding.

Create Panel

Creates a Robot panel element.



(1) RobotNumber [Integer]: Requested robot number for the panel.

(2) Surface [Brep]: Planar surface with openings (if necessary).

(3) Thickness [JFR_PanelThickness]: Thickness of the panel.

(4) Reinforcement [JFR_PanelReinforcement]: Reinforcement of the panel.

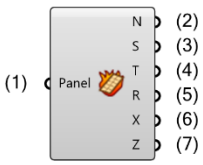
(5) X-Axis [Vector]: X-Axis of the local plane of the panel.

(6) Reverse Z-Axis [Boolean]: Reverse the Z-Axis of the local plane of the panel.

(7) RobotPanel [JFR_Panel]: Panel element.

Deconstruct Panel

Deconstructs a JumpingFrog Robot panel element.



(1) RobotPanel [JFR_Panel]: Panel element.

(2) RobotNumber [Integer]: Number of the element in the Robot model.

(3) Surface [Brep]: Planar surface with openings (if necessary).

(4) Thickness [JFR_PanelThickness]: Thickness of the panel.

(5) Reinforcement [JFR_PanelReinforcement]: Reinforcement of the panel.

(6) X-Axis [Vector]: X-Axis of the local plane of the panel.

Get Surface Edges

Get surface edges from a cladding element.

(1) Cladding [JFR_Cladding]: Cladding.

(2) Surface Edges [JFR_SurfaceEdge]: Surface edges of the cladding.

Deconstruct Surface Edge

Deconstructs a JumpingFrog Robot surface edge element.

(1) RobotSurfaceEdges [JFR_SurfaceEdge]: Represents edges of a surfacic element.

(2) Edge Curve [Curve]: Curve defining the edge geometry.

(3) Edge Index [Integer]: Edge index in the contour.

3.4.Object Utilities

Bar Reversed Attributes

Get the booleans if section, release and offset labels are reversed in a given bar.

(1) Robot Bar [JFR_Bar]: Bar element.

(2) Reversed Section [Boolean]: True if the section is reversed from the axis of the bar.

(3) Reversed Release [Boolean]: True if the release is reversed from the axis of the bar.

(4) Reversed Offset [Boolean]: True if the offset is reversed from the axis of the bar.

Bar dispatcher

Dispatches bars and superbars in their respective types.

(1) Bar [JFR_Bar]: Bar element.

(2) RobotBar [JFR_SimpleBar]: Simple bar element.

(3) RobotSuperBar [JFR_SuperBar]: Super bar element.

Surface dispatcher

Dispatches claddings and panels in their respective types.

(1) Surface [JFR_Surface]: Surface element.

(2) RobotCladding [JFR_Cladding]: Cladding element.

(3) RobotPanel [JFR_Panel]: Panel element.

4. Load Records

4.1. Mass Load

Self-Weight Construct Load

Create a self-weight load record.

(1) Bar [JumpingFrogBar]: Bar element to load.

(2) Direction [Integer]: Direction of mass conversion (0 = +X, 1 = -X, 2 = +Y, 3 = -Y, 4 = +Z, 5 = -Z).

(3) Factor [Number]: Load to mass conversion coefficient (standard = 1.0).

(4) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Self-Weight Deconstruct Load

Deconstruct a self-weight load record.

(1) Self-Weight Load [JFR__LoadRecord]: Self Mass Load to deconstruct.

(2) Bar [JumpingFrogBar]: Robot bar loaded.

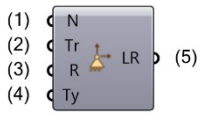
(3) Direction [Integer]: Direction of mass conversion (0 = +X, 1 = -X, 2 = +Y, 3 = -Y, 4 = +Z, 5 = -Z).

(4) Factor [Number]: Load to mass conversion coefficient (standard = 1.0).

4.2. Node Load

Node Displacement Construct Load

Create a node displacement load record.



(1) Node [JFR_Node]: Loaded Node.

(2) Translation [Vector]: Translation vector: Displacement (m), Velocity (m/s), Acceleration (m/s²).

(3) Rotation [Vector]: Rotation vector: Displacement (rad), Velocity (rad/s), Acceleration (rad/s²).

(4) Type [Integer]: Displacement type: 0/Displacement, 1/Velocity, 2/Acceleration.

(5) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Node Displacement Deconstruct Load

Deconstruct a node displacement load record.

(1) Node Displacement Load [JFR__LoadRecord]: Deconstruct a node displacement load record.

(2) Node [JFR_Node]: Loaded Node.

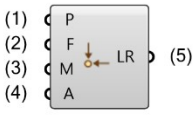
(3) Translation [Vector]: Translation vector: Displacement (m), Velocity (m/s), Acceleration (m/s²).

(4) Rotation [Vector]: Rotation vector: Displacement (rad), Velocity (rad/s), Acceleration (rad/s²).

(5) Type [Integer]: Displacement type: 0/Displacement, 1/Velocity, 2/Acceleration.

Node Force In Point Construct Load

Create a node force load record at a specified point.



(1) Point [Point]: Application point.

(2) Force [Vector]: Vector representing the value of concentrated force (N).

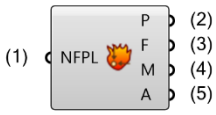
(3) Moment [Vector]: Vector representing the value of moment (N.m).

(4) Angle [Vector]: Vector representing the angle value of force vector in the three coordinates (rad).

(5) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Node Force In Point Deconstruct Load

Deconstruct a node force point load record.



(1) Node Force In Point Load [JFR__LoadRecord]: Node force in point load to deconstruct.

(2) Point [Point]: Application point.

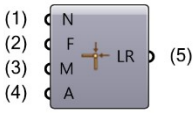
(3) Force [Vector]: Vector representing the value of concentrated force (N).

(4) Moment [Vector]: Vector representing the value of moment (N.m).

(5) Angle [Vector]: Vector representing the angle value of force vector in the three coordinates (rad).

Node Force Construct Load

Create a node force load record.



(1) Node [JFR_Node]: Loaded Node.

(2) Force [Vector]: Vector representing the value of concentrated force (N).

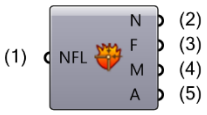
(3) Moment [Vector]: Vector representing the value of moment (N.m).

(4) Angle [Vector]: Vector representing the angle value of force vector in the three coordinates (rad).

(5) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Node Force Deconstruct Load

Deconstruct a node force load record.



(1) Node Force Load [JFR__LoadRecord]: Node force load to deconstruct.

(2) Node [JFR_Node]: Loaded Node.

(3) Force [Vector]: Vector representing the value of concentrated force (N).

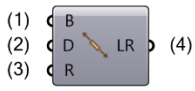
(4) Moment [Vector]: Vector representing the value of moment (N.m).

(5) Angle [Vector]: Vector representing the angle value of force vector in the three coordinates (rad).

4.3. Linear Load

Bar Dilatation Construct Load

Create a bar dilatation load record.



(1) Bar [JumpingFrogBar]: Bar element to load.

(2) Dilatation [Number]: Dilatation value in m if absolute, or in % if relative.

(3) Relative [Boolean]: Use relative dilatation (DL/L) if true, use absolute dilatation (DL) if false.

(4) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Bar Dilatation Deconstruct Load

Deconstruct a bar dilatation load record.

(1) Bar Dilatation Load [JFR__LoadRecord]: Represent a bar dilatation load record.

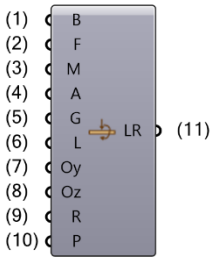
(2) Bar [JumpingFrogBar]: Robot bar loaded.

(3) Dilatation [Number]: Dilatation value in m if absolute, or in % if relative.

(4) Relative [Boolean]: Use relative dilatation (DL/L) if true, use absolute dilatation (DL) if false.

Bar Force Construct Load

Create a bar force load record.



(1) Bar [JumpingFrogBar]: Loaded Bar.

(2) Force [Vector]: Vector representing the value of concentrated force (N).

(3) Moment [Vector]: Vector representing the value of concentrated moment (N.m).

(4) Angle [Vector]: Vector representing the angle value of force vector in the three coordinates (rad).

(5) Generate Calcul Nodes [Boolean]: Generate a calculation node at the point where a load is applied. True, if not provided.

(6) Local [Boolean]: Use local coordinate if true.

(7) Offset Y [Number]: Offset on Y axis of the application point in m. Value 0 m if not provided.

(8) Offset Z [Number]: Offset on Z axis of the application point in m. Value 0 m if not provided.

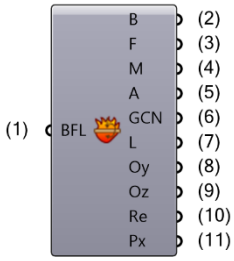
(9) Relative [Boolean]: Use relative position (X/L) if true, use absolute position (X) if false. True, if not provided.

(10) Position X [Number]: X coordinate of the application node in m if absolute, or in % if relative.

(11) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Bar Force Deconstruct Load

Deconstruct a bar force load record.



(1) Bar Force Load [JFR__LoadRecord]: Represent a bar force load record.

(2) Bar [JumpingFrogBar]: Robot bar loaded.

(3) Force [Vector]: Vector representing the value of concentrated force (N).

(4) Moment [Vector]: Vector representing the value of concentrated moment (N.m).

(5) Angle [Vector]: Vector representing the angle value of force vector in the three coordinates (rad).

(6) Generate Calcul Node [Boolean]: Generate a calculation node at the point where a load is applied.

(7) Local [Boolean]: Use local coordinate if true.

(8) Offset Y [Number]: Excentricity on Y axis (m).

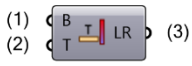
(9) Offset Z [Number]: Excentricity on Z axis (m).

(10) Relative [Boolean]: Use relative position (X/L) if true, use absolute position (X) if false.

(11) Position X [Number]: X coordinate of the application node in m if absolute, or in % if relative.

Bar Thermal Construct Load

Create a bar thermal load record.



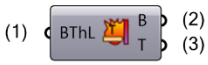
(1) Bar [JumpingFrogBar]: Loaded Bar.

(2) Temperature [Vector]: Vector reprensenting the value of temperature in each direction of the local basis of the bar (°C).

(3) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Bar Thermal Deconstruct Load

Deconstruct a bar thermal load record.



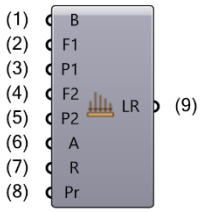
(1) Bar Thermal Load [JFR__LoadRecord]: Represent a bar thermal load record.

(2) Bar [JumpingFrogBar]: Robot bar loaded.

(3) Temperature [Vector]: Vector representing the value of temperature in each direction of the local basis of the bar (°C).

Bar Trapezoidale Construct Load

Create a bar trapezoidale load record.



(1) Bar [JumpingFrogBar]: Loaded Bar.

(2) Force 1 [Vector]: Vector representing the value of concentrated force on position n°1 (N/m).

(3) Position 1 [Number]: Position of the application point of Force 1.

(4) Force 2 [Vector]: Vector representing the value of concentrated force on position n°2 (N/m).

(5) Position 2 [Number]: Position of the application point of Force 2.

(6) Angle [Vector]: Vector representing the angle value of force vector in the three coordinates (rad).

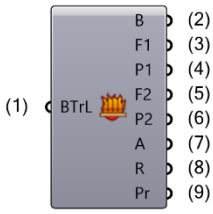
(7) Relative [Boolean]: Use relative position (X/L) if true, use absolute position (X) if false.

(8) Projection [Boolean]: Project loads if true.

(9) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Bar Trapezoidale Deconstruct Load

Deconstruct a bar trapezoidale load record.



(1) Bar Trapezoidale Load [JFR__LoadRecord]: Represent a bar trapezoidale load record.

(2) Bar [JumpingFrogBar]: Robot bar loaded.

(3) Force 1 [Vector]: Vector representing the value of concentrated force on position n°1 (N/m).

(4) Position 1 [Number]: Position of the application point of Force 1.

(5) Force 2 [Vector]: Vector representing the value of concentrated force on position n°2 (N/m).

(6) Position 2 [Number]: Position of the application point of Force 2.

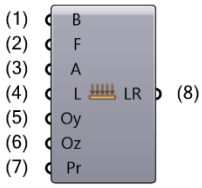
(7) Angle [Vector]: Vector representing the angle value of force vector in the three coordinates (rad).

(8) Relative [Boolean]: Use relative position (X/L) if true, use absolute position (X) if false.

(9) Projection [Boolean]: Project loads if true.

Bar Uniform Construct Load

Create a bar uniform load record.



(1) Bar [JumpingFrogBar]: Loaded bar.

(2) Force [Vector]: Vector representing the value of linear force (N/m).

(3) Angle [Vector]: Vector representing the angle value of force vector in the three coordinates (rad).

(4) Local [Boolean]: Use local coordinate if true.

(5) Offset Y [Number]: Eccentricity on Y axis (m).

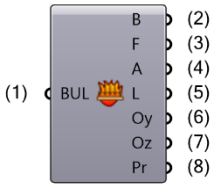
(6) Offset Z [Number]: Eccentricity on Z axis (m).

(7) Projection [Boolean]: Project loads if true.

(8) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Bar Uniform Deconstruct Load

Deconstruct a bar uniform load record.



(1) Bar Uniform Load [JFR__LoadRecord]: Represent a bar uniform load record.

(2) Bar [JumpingFrogBar]: Robot bar loaded.

(3) Force [Vector]: Vector representing the value of linear force (N/m).

(4) Angle [Vector]: Vector representing the angle value of force vector in the three coordinates (rad).

(5) Local [Boolean]: Use local coordinate if true.

(6) Offset Y [Number]: Eccentricity on Y axis (m).

(7) Offset Z [Number]: Eccentricity on Z axis (m).

(8) Projection [Boolean]: Project loads if true.

Bar Uniform Moment Construct Load

Create a bar uniform moment load record.

(1) Bar [JumpingFrogBar]: Loaded bar.

(2) Moment [Vector]: Vector representing the value of uniform moment (N.m/m).

(3) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Bar Uniform Moment Deconstruct Load

Deconstruct a bar uniform moment load record.

(1) Bar Uniform Moment Load [JFR__LoadRecord]: Represent a bar uniform moment load record.

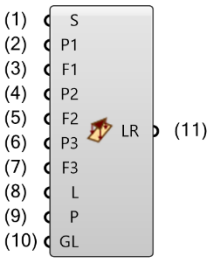
(2) Bar [JumpingFrogBar]: Robot bar loaded.

(3) Moment [Vector]: Vector representing the value of uniform moment (N.m/m).

4.4. Surface Load

Surface Planar 3Pts Construct Load

Create a surface planar 3pts load record.



(1) Surface [JumpingFrogSurface]: Loaded surface.

(2) Point 1 [Point]: First point of plane.

(3) Force 1 [Vector]: Vector representing the value of the pressure at first point of planar load (N/m²).

(4) Point 2 [Point]: Second point of plane.

(5) Force 2 [Vector]: Vector representing the value of the pressure at second point of planar load (N/m²).

(6) Point 3 [Point]: Third point of plane.

(7) Force 3 [Vector]: Vector representing the value of the pressure at third point of planar load (N/m²).

(8) Local [Boolean]: Load values refer to local coordinate system if true.

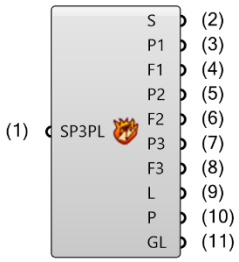
(9) Project [Boolean]: Project load if true.

(10) Geometrical Limits [JFR_GeometricalLimits]: JFR_GeometricalLimits representing geometrical limits of a load case.

(11) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Surface Planar 3Pts Deconstruct Load

Deconstruct a surface planar 3pts load record.



(1) Surface Planar 3Pts Load [JFR__LoadRecord]: Represent a surface planar 3points load record.

(2) Surface [JFR_Cladding]: Loaded surface.

(3) Point 1 [Point]: First point of plane.

(4) Force 1 [Vector]: Vector representing the value of the pressure at first point of planar load (N/m²).

(5) Point 2 [Point]: Second point of plane.

(6) Force 2 [Vector]: Vector representing the value of the pressure at second point of planar load (N/m²).

(7) Point 3 [Point]: Third point of plane.

(8) Force 3 [Vector]: Vector representing the value of the pressure at third point of planar load (N/m²).

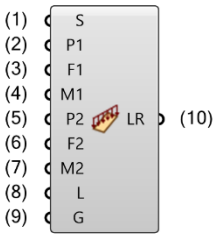
(9) Local [Boolean]: Load values refer to local coordinate system if true.

(10) Project [Boolean]: Project load if true.

(11) Geometrical Limits [JFR_GeometricalLimits]: JFR_GeometricalLimits representing geometrical limits of a load case.

Surface Linear 2Pts Construct Load

Create a surface linear 2pts load record.



(1) Surface [JumpingFrogSurface]: Loaded surface.

(2) Point 1 [Point]: First point of linear force.

(3) Force 1 [Vector]: Vector representing the value of the force at first point of linear load (N/m).

(4) Moment 1 [Vector]: Vector representing the value of the moment at first point of linear load (N.m/m).

(5) Point 2 [Point]: Second point of linear force.

(6) Force 2 [Vector]: Vector representing the value of the force at second point of linear load (N/m).

(7) Moment 2 [Vector]: Vector representing the value of the moment at second point of linear load (N.m/m).

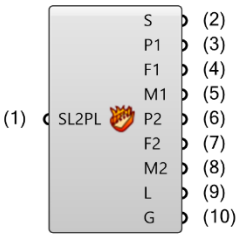
(8) Local [Boolean]: Load values refer to local coordinate system if true.

(9) Gamma [Number]: Rotation angle of the defined linear loads measured around the line of action (rad).

(10) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Surface Linear 2Pts Deconstruct Load

Deconstruct a surface linear 2Pts load record.



(1) Surface Linear 2Pts Load [JFR__LoadRecord]: Represent a surface linear 2points load record.

(2) Surface [JFR_Cladding]: Loaded surface.

(3) Point 1 [Point]: First point of linear force.

(4) Force 1 [Vector]: Vector representing the value of the force at first point of linear load (N/m).

(5) Moment 1 [Vector]: Vector representing the value of the moment at first point of linear load (N.m/m).

(6) Point 2 [Point]: Second point of linear force.

(7) Force 2 [Vector]: Vector representing the value of the force at second point of linear load (N/m).

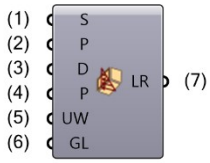
(8) Moment 2 [Vector]: Vector representing the value of the moment at second point of linear load (N.m/m).

(9) Local [Boolean]: Load values refer to local coordinate system if true.

(10) Gamma [Number]: Rotation angle of the defined linear loads measured around the line of action.

Surface Hydrostatic Construct Load

Create a surface hydrostatic load record.



(1) Surface [JumpingFrogSurface]: Loaded surface.

(2) Pressure [Number]: Number reprensenting the constant pressure value (independent from liquid) (N/m^2).

(3) Direction [Integer]: Direction of gravity for liquid (0 : -X, 1 : -Y, 2 : -Z, 3 : X, 4 : Y, 5 : Z).

(4) Height [Number]: Liquid level (m).

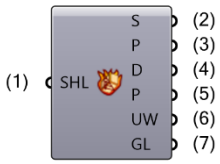
(5) Unit Weight [Number]: Unit weight of liquid (kg/m^3).

(6) Geometrical Limits [JFR__Utility]: JFR_GeometricalLimits representing geometrical limits of a load case.

(7) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Surface Hydrostatic Deconstruct Load

Deconstruct a surface hydrostatic load record.



(1) Surface Hydrostatic Load [JFR__LoadRecord]: Surface hydrostatic load to deconstruct.

(2) Surface [JFR_Cladding]: Loaded surface.

(3) Pressure [Number]: Number reprensenting the constant pressure value (independent from liquid) (N/m^2).

(4) Direction [Integer]: Direction of gravity for liquid (0 : -X, 1 : -Y, 2 : -Z, 3 : X, 4 : Y, 5 : Z).

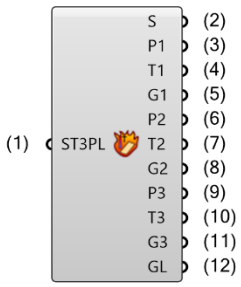
(5) Height [Number]: Liquid level (m).

(6) Unit Weight [Number]: Unit weight of liquid (kg/m^3).

(7) Geometrical Limits [JFR__Utility]: JFR_GeometricalLimits representing geometrical limits of a load case.

Surface Thermal 3Pts Deconstruct Load

Deconstruct a surface thermal 3pts load record.



(1) Surface Thermal 3Pts Load [JFR__LoadRecord]: Represent a surface thermal 3points load record.

(2) Surface [JFR_Cladding]: Loaded surface.

(3) Point 1 [Point]: First point of surface.

(4) Temperature 1 [Number]: Change of the middle surface temperature in the first point of surface for uniform or variable temperature change definition.

(5) Gradient 1 [Number]: Change of the temperature gradient (along local z-axis) in the first point of surface for uniform or variable temperature change definition.

(6) Point 2 [Point]: Second point of surface.

(7) Temperature 2 [Number]: Change of the middle surface temperature in the second point of surface for uniform or variable temperature change definition.

(8) Gradient 2 [Number]: Change of the temperature gradient (along local z-axis) in the second point of surface for uniform or variable temperature change definition.

(9) Point 3 [Point]: Third point of surface.

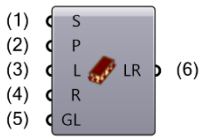
(10) Temperature 3 [Number]: Change of the middle surface temperature in the third point of surface for uniform or variable temperature change definition.

(11) Gradient 3 [Number]: Change of the temperature gradient (along local z-axis) in the third point of surface for uniform or variable temperature change definition.

(12) Geometrical Limits [JFR__Utility]: JFR_GeometricalLimits representing geometrical limits of a load case.

Surface Uniform Planar Construct Load

Create a surface uniform planar load record



(1) Surface [JumpingFrogSurface]: Loaded surface.

(2) Pressure [Vector]: Vector representing the value of the pressure of the uniform planar load (N/m²).

(3) Local [Boolean]: Parameter assumes the value 0 (zero) when the load acts in the global system and the value different from zero when the load acts in the local system.

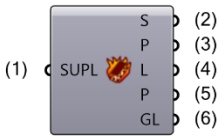
(4) Projected [Boolean]: Flag indicating whether the load is to be projected

(5) Geometrical Limits [JFR__Utility]: JFR_GeometricalLimits representing geometrical limits of a load case.

(6) **Load Record [JFR_LoadRecord]:** JFR_LoadRecord Parameter.

Surface Uniform Planar Deconstruct Load

Deconstruct a surface uniform planar load record



(1) Surface Uniform Planar Load [JFR_LoadRecord]: Surface uniform planar load to deconstruct

(2) Surface [JFR_Cladding]: Loaded surface

(3) Pressure [Vector]: Vector representing the value of the pressure of the uniform planar load (N/m²)

(4) Local [Boolean]: Parameter assumes the value 0 (zero) when the load acts in the global system and the value different from zero when the load acts in the local system

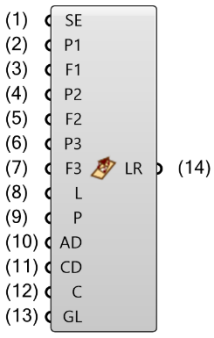
(5) Projected [Boolean]: Flag indicating whether the load is to be projected

(6) Geometrical Limits [JFR_Utility]: JFR_GeometricalLimits representing geometrical limits of a load case

4.5. Surface On Edge Load

Surface Planar 3Pts On Contour Construct Load

Create a surface planar 3pts on contour load record.



(1) Surface Edge [JFR_SurfaceEdge]: Loaded contour element.

(2) Point 1 [Point]: First point of plane.

(3) Force 1 [Vector]: Vector representing the value of the pressure at first point of planar load (N/m²).

(4) Point 2 [Point]: Second point of plane.

(5) Force 2 [Vector]: Vector representing the value of the pressure at second point of planar load (N/m²).

(6) Point 3 [Point]: Third point of plane.

(7) Force 3 [Vector]: Vector representing the value of the pressure at third point of planar load (N/m²)

(8) Local [Boolean]: Use local coordinate if true.

(9) Project [Boolean]: Project load if true.

(10) Automatic Detection [Boolean]: Automatic panel selection in the contour plane.

(11) Contour Direction [Vector]: Direction of contour projection. No use if Automatic Detection is true.

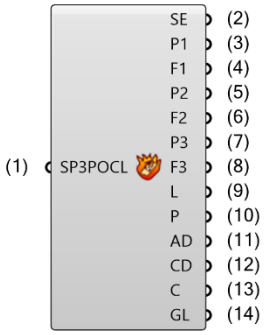
(12) Contour [Curve]: Contour to load.

(13) Geometrical Limits [JFR__Utility]: JFR_GeometricalLimits representing geometrical limits of a load case.

(14) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Surface Planar 3Pts On Contour Deconstruct Load

Deconstruct a surface planar 3pts on contour load record.



(1) Surface Planar 3Pts On Contour Load [JFR__LoadRecord]: Represent a surface planar 3pts on contour load record.

(2) Surface Edge [JFR_SurfaceEdge]: Loaded contour element.

(3) Point 1 [Point]: First point of plane.

(4) Force 1 [Vector]: Vector representing the value of the pressure at first point of planar load (N/m²).

(5) Point 2 [Point]: Second point of plane.

(6) Force 2 [Vector]: Vector representing the value of the pressure at second point of planar load (N/m²).

(7) Point 3 [Point]: Third point of plane.

(8) Force 3 [Vector]: Vector representing the value of the pressure at third point of planar load (N/m²).

(9) Local [Boolean]: Use local coordinate if true.

(10) Project [Boolean]: Project load if true.

(11) Automatic Detection [Boolean]: Automatic panel selection in the contour plane.

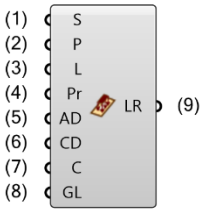
(12) Contour Direction [Vector]: Direction of contour projection. No use if Automatic Detection is true.

(13) Contour [Curve]: Contour to load.

(14) Geometrical Limits [JFR__Utility]: JFR_GeometricalLimits representing geometrical limits of a load case.

Surface Uniform Planar On Contour Construct Load

Create a surface uniform planar on contour load record.



(1) Surface [JumpingFrogSurface]: Loaded contour element.

(2) Pressure [Vector]: Pressure.

(3) Local [Boolean]: Parameter assumes the value 0 (zero) when the load acts in the global system and the value different from zero when the load acts in the local system.

(4) Projected [Boolean]: Flag indicating whether the load is to be projected.

(5) Automatic Detection [Boolean]: Automatic panel selection in the contour plane.

(6) Contour Direction [Vector]: Direction of contour projection. No use if Automatic Detection is true.

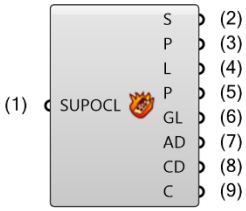
(7) Contour [Curve]: Contour to load.

(8) Geometrical Limits [JFR__Utility]: JFR_GeometricalLimits representing geometrical limits of a load case.

(9) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter.

Surface Uniform Planar On Contour Deconstruct Load

Deconstruct a surface uniform planar on contour load record.



(1) Surface Uniform Planar On Contour Load [JFR_LoadRecord]: Represent a surface uniform planar on contour load record.

(2) Surface [JFR_Cladding]: Loaded surface.

(3) Pressure [Vector]: Pressure.

(4) Local [Boolean]: Use local coordinate if true.

(5) Project [Boolean]: Project load if true.

(6) Geometrical Limits [JFR__Utility]: JFR_GeometricalLimits representing geometrical limits of a load case.

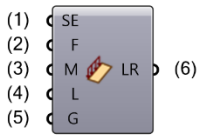
(7) Automatic Detection [Boolean]: Automatic panel selection in the contour plane.

(8) Contour Direction [Vector]: Direction of contour projection. No use if Automatic Detection is true.

(9) Contour [Curve]: Contour to load.

Surface Linear On Edge Construct Load

Create a surface linear on edges load record.



(1) Surface Edge [JFR_SurfaceEdge]: Loaded contour element.

(2) Force [Vector]: Vector representing the value of the linear force load (N/m).

(3) Moment [Vector]: Vector representing the value of the linear moment load (N.m/m).

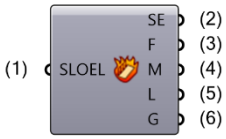
(4) Local [Boolean]: Parameter assumes the value 0 (zero) when the load acts in the global system and the value different from zero when the load acts in the local system.

(5) Gamma [Number]: Rotation angle of the defined linear loads measured around the line of action.

(6) Load Record [JFR_LoadRecord]: JFR_LoadRecord Parameter.

Surface Linear On Edge Deconstruct Load

Deconstruct a surface linear on edge load record.



(1) Surface Linear On Edge Load [JFR_LoadRecord]: Represent a surface linear on edge load record.

(2) Surface Edge [JFR_SurfaceEdge]: Loaded contour element.

(3) Force [Vector]: Vector representing the value of the linear force load (N/m).

(4) Moment [Vector]: Vector representing the value of the linear moment load (N.m/m).

(5) Local [Boolean]: Parameter assumes the value 0 (zero) when the load acts in the global system and the value different from zero when the load acts in the local system.

(6) Gamma [Number]: Rotation angle of the defined linear loads measured around the line of action.

4.6. Load Record Utilities

Construct Geometrical Limits

JFR_GeometricalLimits representing geometrical limits of a load case.

(1) Plane [Plane]: Definition of a layer as a space sector. Layer is defined by specifying a cutting plane (by means of three points: P1, P2 and P3) and the fourth PDir point determining a half - space direction. Additionally, layer thickness may be determined by specifying the Thickness value.

(2) Thickness [Number]: Force decomposition on X axis of the local plane.

(3) Geometrical Limits [JFR__Utility]: JFR_GeometricalLimits representing geometrical limits of a load case.

Deconstruct Geometrical Limits

Deconstruct JFR_GeometricalLimits.

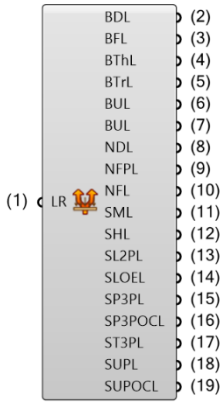
(1) Geometrical Limits [JFR__Utility]: JFR_GeometricalLimits representing geometrical limits of a load case.

(2) Plane Selection [Plane]: Definition of a layer as a space sector. Layer is defined by specifying a cutting plane (by means of three points: P1, P2 and P3) and the fourth PDir point determining a half-space direction. Additionally, layer thickness may be determined by specifying the Thickness value.

(3) Thickness [Number]: Layer thickness may be determined by specifying the Thickness value. If the layer thickness is not specified, the layer describes the entire half-space.

Load Record Dispatcher

Dispatches load records in their respective type.



(1) Load Record [JFR_LoadRecord]: Load Record.

(2) Bar Dilatation Load [JFR_LoadRecord]: Represent a bar dilatation load record.

(3) Bar Force Load [JFR_LoadRecord]: Represent a bar force load record.

(4) Bar Thermal Load [JFR_LoadRecord]: Represent a bar thermal load record.

(5) Bar Trapezoidal Load [JFR_LoadRecord]: Represent a bar trapezoidal load record.

(6) Bar Uniform Load [JFR_LoadRecord]: Represent a bar uniform load record.

(7) Bar Uniform Moment Load [JFR_LoadRecord]: Represent a bar uniform moment load record.

(8) Node Displacement Load [JFR_LoadRecord]: Represent a node displacement load record.

(9) Node Force In Point Load [JFR_LoadRecord]: Represent a node force in point load record.

(10) Node Force Load [JFR_LoadRecord]: Represent a node force load record.

(11) Self-Weight Load [JFR_LoadRecord]: Represent self-mass load record.

(12) Surface Hydrostatic Load [JFR_LoadRecord]: Represent a surface hydrostatic load record.

(13) Surface Linear 2Pts Load [JFR_LoadRecord]: Represent a surface linear 2points load record.

(14) Surface Linear On Edge Load [JFR_LoadRecord]: Represent a surface linear on edge load record.

(15) Surface Planar 3Pts Load [JFR_LoadRecord]: Represent a surface planar 3points load record.

(16) Surface Planar 3Pts On Contour Load [JFR_LoadRecord]: Represent a surface planar 3pts on contour load record.

(17) Surface Thermal 3Pts Load [JFR_LoadRecord]: Represent a surface thermal 3points load record.

(18) Surface Uniform Planar Load [JFR_LoadRecord]: Represent a surface uniform planar load record.

(19) Surface Uniform Planar On Contour Load [JFR_LoadRecord]: Represent a surface uniform planar on contour load record.

5. Load Cases

5.1. Load Cases

Construct Simple Load Case

Create a robot simple load case.

(1) Number [Integer]: Number of the load case.

(2) Name [Text]: Name of the load case.

(3) Nature [Integer]: Nature of the load case.

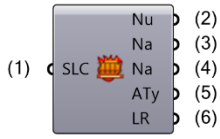
(4) Analyse Type [Integer]: Analyse Type of the load case.

(5) Load Record [JFR_LoadRecord]: JFR_LoadRecord Parameter.

(6) Simple Load Case [JFR_LoadCase]: JFR_SimpleLoadCase Parameter.

Deconstruct Simple Load Case

Deconstruct a simple load case.



(1) Simple Load Case [JFR__LoadCase]: Simple Load case to deconstruct.

(2) Number [Integer]: Number of the load case.

(3) Name [Text]: Name of the load case.

(4) Nature [Integer]: Nature of the load case.

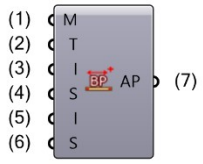
(5) AnaliseType [Integer]: Analyse type of the load case.

(6) Load Record [JFR__LoadRecord]: JFR_LoadRecord Parameter to deconstruct.

5.2. Load Cases Options

Analyse Buckling Construct Parameters

Create a robot Analyse Buckling Parameters for combination.



(1) Modes [Integer]: Number of modes for buckling.

(2) Tolerance [Number]: Tolerance for buckling.

(3) Iterations [Integer]: Number of iterations for buckling.

(4) Shift [Number]: Shift for buckling, 0 if not provided.

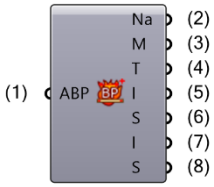
(5) Increment [Integer]: Increment for buckling, 0 if not provided.

(6) Sturm [Boolean]: Sturm check, true if not provided.

(7) Analyse Parameters [JFR__LoadCase]: Analyse parameters of the combination.

Analyse Buckling Deconstruct Parameters

Deconstruct analyse buckling parameters for combination.



(1) Analyse Buckling Parameters [JFR__LoadCase]: Analyse Buckling Parameters for combination to deconstruct.

(2) Nature [Integer]: Nature of the combination.

(3) Modes [Integer]: Number of modes for buckling.

(4) Tolerance [Number]: Tolerance for buckling.

(5) Iterations [Integer]: Number of iterations for buckling.

(6) Shift [Number]: Shift for buckling, 0 if not provided.

(7) Increment [Integer]: Increment for buckling, 0 if not provided.

(8) Sturm [Boolean]: Sturm check, true if not provided.

Analyse Static Construct Parameters

Create a robot Analyse Static Parameters for combination.

(1) Auxiliary [Boolean]: Is an auxiliary combination.

(2) Analyse Parameters [JFR_LoadCase]: Analyse parameters of the combination.

Analyse Static Deconstruct Parameters

Deconstruct analyse static parameters for combination.

(1) Analyse Static Parameters [JFR_LoadCase]: Analyse Static Parameters for combination to deconstruct.

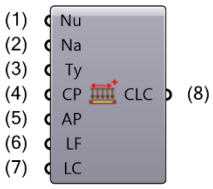
(2) Nature [Integer]: Nature of the combination.

(3) Auxiliary [Boolean]: Is an auxiliary combination.

5.3. Load Combinations

Construct Combination Load Case

Create a robot combination load case.



(1) Number [Integer]: Number of the load case.

(2) Name [Text]: Name of the load case.

(3) Type [Integer]: Type of the load case.

(4) Combination Parameters [JFR_LoadCase]: Combination load case parameter as JFR_CombinationParameters.

(5) Analyse Parameters [JFR_LoadCase]: Analyse load case parameter as JFR_CombinationAnalyseParameters.

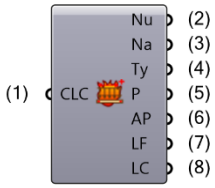
(6) Load Factors [Number]: Load factors for combination.

(7) Load Cases [JFR_LoadCase]: JFR_LoadCase to combine.

(8) Combination Load Case [JFR_LoadCase]: JFR_CombinationLoadCase Parameter.

Deconstruct Combination Load Case

Deconstruct combination load case.



(1) Combination Load Case [JFR__LoadCase]: Combination Load case to deconstruct.

(2) Number [Integer]: Number of the load case.

(3) Name [Text]: Name of the load case.

(4) Type [Integer]: Type of the combination.

(5) Parameters [JFR__LoadCase]: Parameters of the combination.

(6) Analyse Parameters [JFR__LoadCase]: Analyse parameters of the combination.

(7) Load Factors [Number]: Load factors for combination.

(8) Load Cases [JFR__LoadCase]: JFR_LoadCase to combine.

5.4. Load Combinations Options

Construct Combination Parameters

Create a robot buckling combination load case parameters.

(1) Nature [Integer]: Nature of the load case.

(2) Seismic Type [Integer]: Seismic Combination Type.

(3) Quadratic [Boolean]: Is the combination quadratic.

(4) Combination Parameters [JFR_LoadCase]: Combination load case parameters.

Deconstruct Combination Parameters

Deconstruct combination load case parameters.

(1) Combination Parameters [JF Robot] [JFR_LoadCase]: Create a robot buckling combination load case parameters.

(2) Nature [Integer]: Nature of the load case.

(3) Seismic Type [Integer]: Seismic Combination Type.

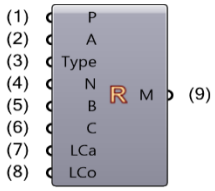
(4) Quadratic [Boolean]: Is the combination quadratic.

6. Model

6.1. Model

Construct Model

Constructs a Robot model with the specified elements.



(1) Path [Text]: Path to the saved model file.

(2) Activate [Boolean]: Turns model construction on or off.

(3) ProjectType [Integer]: Type of the project to create.

(4) Nodes [JFR_Node]: Nodes in the model.

(5) Bars [JFR_Bar]: Bar and superbars elements in the model.

(6) Claddings [JFR_Cladding]: Cladding elements in the model.

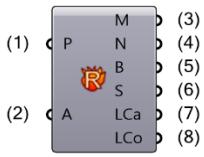
(7) Load Cases [JFR_LoadCase]: Load cases in the model.

(8) Load Combinations [JFR_LoadCase]: Load combination cases in the model.

(9) Model [JFR_Model]: JFR_Model in order to run calculus and get results.

Deconstruct Model

Deconstructs the specified Robot model.



(1) Path [Text]: Path to the Robot model file to deconstruct.

(2) Activate [Boolean]: Turns model deconstruction on or off.

(3) Model [JFR_Model]: JFR_Model calculated.

(4) Nodes [JFR_Node]: Nodes in the model.

(5) Bars [JFR_Bar]: Bar elements in the model.

(6) Surfaces [JFR_Surface]: Surface elements in the model.

(7) Load Cases [JFR_LoadCase]: Load cases in the model.

(8) Load Combinations [JFR_LoadCase]: Load combinations in the model.

6.2. Calculation

Calculate Model

Run calculations on a given model and give the calculated model.

(1) Model [JFR_Model]: JFR_Model to run calculations.

(2) Messages [Text]: Messages Robot sent during the calculations.

(3) Model [JFR_Model]: JFR_Model calculated.

7. Results

7.1. Node Query

Query Node Displacements

Query nodes displacements on a given calculated model. Results are in meters.

Results are output in this order Ux, Uy, Uz, Rx, Ry and then Rz.

The output tree is ordered like {NodeNumber;LoadCaseNumber}.

(1) Model [JFR_Model]: JFR_Model to query.

(2) Nodes [JFR_Node]: List of nodes to query on.

(3) Load Cases [JFR_LoadCase]: List of load cases to query on.

(4) Results [Number]: Results of asked queries.

Query Node Strength

Query nodes strengths on a given calculated model. Results are in Newton.

Results are output in this order Fx, Fy, Fz, Mx, My and then Mz.

The output tree is ordered like {NodeNumber;LoadCaseNumber}.

(1) Model [JFR_Model]: JFR_Model to query.

(2) Nodes [JFR_Node]: List of nodes to query on.

(3) Load Cases [JFR_LoadCase]: List of load cases to query on.

(4) Results [Number]: Results of asked queries.

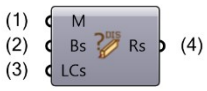
7.2. Bar Query

Query Bar Displacements

Query bar displacements on a given calculated model.

Results are in meters. Results are output in this order Ux, Uy, Uz, Rx, Ry, Rz, DefX, DefY and then DefZ.

The output tree is ordered like {BarNumber; LoadCaseNumber; DivisionNumber}.



(1) Model [JFR_Model]: JFR_Model to query.

(2) Bars [JFR_Bar]: List of bars to query on.

(3) Load Cases [JFR_LoadCase]: List of load cases to query on.

(4) Results [Number]: Results of asked queries.

Query Bar Strength

Query bar strength on a given calculated model. Results are in Newton.

Results are output in this order Fx, Fy, Fz, Mx, My and then Mz.

The output tree is ordered like {BarNumber; LoadCaseNumber; DivisionNumber}.

(1) Model [JFR_Model]: JFR_Model to query.

(2) Bars [JFR_Bar]: List of bars to query on.

(3) Load Cases [JFR_LoadCase]: List of load cases to query on.

(4) Results [Number]: Results of asked queries.

Query Bar Stresses

Query bar stresses on a given calculated model. Results are in N/m².

Results are output in this order Smax, Smin, Smax-My, Smax-Mz, Smin-My, Smin-Mz, Fx-Sx, T, Ty and then Tz.

The output tree is ordered like {BarNumber; LoadCaseNumber; DivisionNumber}.

(1) Model [JFR_Model]: JFR_Model to query.

(2) Bars [JFR_Bar]: List of bars to query on.

(3) Load Cases [JFR_LoadCase]: List of load cases to query on.

(4) Results [Number]: Results of asked queries.

weArk SAS
128 rue de la Boétie 75008 PARIS
contact@we-ark.fr - www.we-ark.fr