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English user manual / 17 components / Rhino 8.24 or newer on Windows

Complete input and output reference, placement conventions, material workflows, Value List modes, examples and validation limits.

Open-source release / 4 November 2026

Installation and migration

Extract the ZIP before installation. Copy AEGIS.Components.gha into Grasshopper > File > Special Folders > Components Folder, then restart Rhino. The AEGIS tab contains seven categories.

Alternatively install the local .yak package using Rhino package tools. Use one installation method, not both. Nothing has been published to a public package server.

Library and component identifiers are preserved. Close Rhino and remove any older copy of this library, or uninstall its earlier local package, before installing this update. Install only one copy of AEGIS.

Open examples/AEGIS_Starter.gh after installation. It contains an internalized guide, an enabled Guide Join and 16 disabled generator components. Enable one generator at a time.

Source algorithms and independent GHX component definitions are included in source and components. Examples use original synthetic geometry.

If Windows marks a downloaded file as blocked, inspect its Properties and use Unblock when appropriate. The package performs no automatic installation or changes to your model.

Units, guide and material workflow

Facade tools use centimetres: 1 mm=0.1 cm, 1 m=100 cm. Life Lab 3D is the exception: VoxelM is metres and is automatically converted to document units.

For generators based on the fixed project dimensions, C is the top/front edge of the lowest beam. The opening from lower-beam top to upper-beam underside is 315 cm. Beam height is 85 cm and storey pitch is 400 cm.

Older tools expose H or Height instead. Follow each component note; do not assume every Height input means a single clear opening.

Feed a flattened list of connected curve segments into Guide Join. Connect its Joined Guide output to the C input of the selected generator. Generators take one joined curve, not separate segment branches.

Compact parameter nicknames are retained for code compatibility. Full names and brief descriptions appear in parameter tooltips. Positions is a List; most other numeric controls are Item inputs.

Route every material output through a separate Model Object with a unique layer, merge the model objects, then send them to Content Cache. Preview colours are not Rhino/Lumion render materials.

Copper sheets and chain-curtain proxies need cutout/opacity materials. Using lightweight meshes is compatible with the intended render workflow; ExactBrep is not a prerequisite for Content Cache.

The standard Python console port is not published as a separate plugin output. Runtime errors appear on the component; existing Info outputs provide calculation reports.

Component directory

 **01 Guide Join** Tools

 **02 Patterned Members** Louvers

 **03 Kinked Louvers** Louvers

 **04 Cables and Beads** Cables

 **05 Hinged Glass** Glass

 **06 Glass Bricks** Glass

 **07 Double U Glass** Glass

 **08 Half Floor Cables** Cables

 **09 Copper Glass Pivots** Glass

 **10 Return Louvers** Louvers

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 **12 Density U Panels** Screens

 **13 Sliding Facade** Sliding

 **14 Ring Curtains** Screens

 **15 Twisted Ribbons** Screens

 **16 Filleted Corner Fins** Louvers

 **17 Life Lab 3D** Form Finding

Guide Join / visual guide

ORIGINAL SYNTHETIC EXAMPLE

01 Guide Join

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: Separate segments

OUTPUT: One connected guide

JoinCurves + explicit small-gap bridges

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Guide Join

01 / TOOLS



Joins one guide and reports explicit straight bridges of unambiguous endpoint gaps up to 10 document units; larger or ambiguous gaps are rejected.

Inputs

Guide Curves [C]

Flattened LIST of guide curves. Small unambiguous gaps up to 10 document units get explicit straight bridges; larger/ambiguous gaps are rejected.

Access: List / Optional input default: internal code default

Join Tolerance [Tol]

Maximum allowed endpoint gap in document units; does not bridge a larger gap.

Access: Item / Optional input default: 0.01

Outputs

Console Log [out]

Console messages, warnings and captured script errors.

Joined Guide [a]

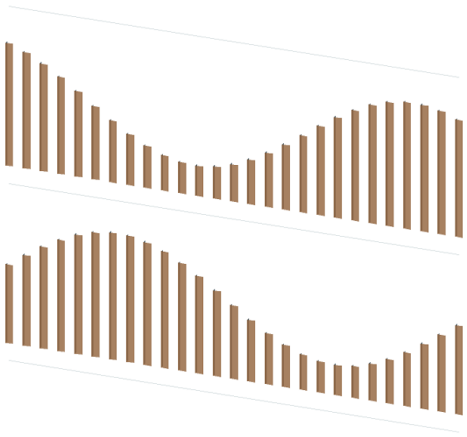
One connected guide curve; connect to generator C inputs.

Patterned Members / visual guide

ORIGINAL SYNTHETIC EXAMPLE

02 Patterned Members

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: Pattern + Randomness

OUTPUT: Frames / Front / Back

Change lengths while preserving the station grid

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Patterned Members

02 / LOUVERS



Produces either round members or rectangular framed panels. Length patterns, randomness and disappearing members can be controlled separately.

For separate materials use Frames, Front and Back. Pipes/Combined Members already includes enabled parts: do not bake both routes.

In rectangular mode the local section convention matters. Angle and Align control its direction; inspect one small test before generating all floors.

Inputs

Guide Curves [C]

ONE connected horizontal guide curve; Item Access. Horizontal facade guide. Tools/Guide Join accepts a flattened list; generators accept ONE joined curve.

Access: Item / Optional input default: internal code default

Floor Count [F]

Number of repeated floor levels, starting at the guide elevation.

Access: Item / Optional input default: 1

Storey Pitch [H]

Vertical distance from one repeated floor datum to the next.

Access: Item / Optional input default: 400

Maximum Base Length [Lmax]

Upper nominal member length before upper/lower boundary changes.

Access: Item / Optional input default: 400

Minimum Length [Lmin]

Minimum allowed member length; zero enables disappearing members.

Access: Item / Optional input default: 0

Member Count [N]

Positive value fixes count; zero uses automatic spacing where supported.

Access: Item / Optional input default: 50

Round Diameter [Dia]

External diameter in round-section mode.

Access: Item / Optional input default: 4

Patterned Members / continued

Clear Member Gap [Gap]

Requested clear gap in automatic count mode; fixed count may override it.

Access: Item / Optional input default: 0

Upper Variation Amplitude [AT]

Amplitude of the upper end retreat.

Access: Item / Optional input default: 500

Lower Variation Amplitude [AB]

Amplitude of lower end movement; negative values can extend below the datum.

Access: Item / Optional input default: 0

Length Fade [Fade]

Strength of the threshold that shortens or removes members.

Access: Item / Optional input default: 0.05

Length Pattern [Pattern]

Selects sine, triangle, harmonic, smooth noise, random or cosine lobes.

Access: Item / Optional input default: 0

Random Strength [Randomness]

Strength of random variation. Seed chooses a reproducible arrangement.

Access: Item / Optional input default: 0.17

Local Jitter [Jitter]

Additional independent per-position variation.

Access: Item / Optional input default: 0.13

Noise Scale [NoiseScale]

Spatial frequency of the smooth noise field.

Access: Item / Optional input default: 3

Pattern Phase [Phase]

Shifts the pattern along its normalized cycle.

Access: Item / Optional input default: 1

Patterned Members / continued

Pattern Exponent [Power]

Changes the contrast and curvature of the pattern response.

Access: Item / Optional input default: 1.42

End Pattern Link [Link]

Coupling of the upper and lower end patterns.

Access: Item / Optional input default: 0

Pattern Floor Variation [FloorVar]

Strength of per-floor pattern variation.

Access: Item / Optional input default: 1

Section Type [Section]

Zero=round; one=rectangular framed panel.

Access: Item / Optional input default: 0

Section Width [RectW]

External rectangular section width. Refer to this component's local section convention.

Access: Item / Optional input default: 5

Section Depth [RectD]

External rectangular section depth, perpendicular to the local guide.

Access: Item / Optional input default: 20

Wall Thickness [Wall]

Positive values create hollow walls; zero follows this component's filled/default-wall behaviour.

Access: Item / Optional input default: 0.758

Rotation Angle [Angle]

Angle in degrees relative to the local facade tangent.

Access: Item / Optional input default: 0

Align to Guide [Align]

True aligns sections with the guide tangent; false uses world directions.

Access: Item / Optional input default: True

Patterned Members / continued

Show Front Sheet [ShowFront]

Enables the front material sheet; the perimeter frame remains.

Access: Item / Optional input default: True

Show Back Sheet [ShowBack]

Enables the rear material sheet; the perimeter frame remains.

Access: Item / Optional input default: True

Outputs

Combined Members [Pipes]

Combined render geometry. Do not also bake the separate frame/face outputs.

Axes [Axes]

Member centreline curves; layout helpers, not solid geometry.

Bottom [Bottom]

Lower attachment/end points.

Top [Top]

Upper attachment/end points.

Lengths [Lengths]

Actual member axis lengths in document units.

Calculation Report [Info]

Counts, dimensions, timing, placement conventions and error messages.

Perimeter Frames [Frames]

Frame material geometry; separate from copper/chrome face sheets.

Front Face Sheets [Front]

First material sheet, separate from frames.

Back Face Sheets [Back]

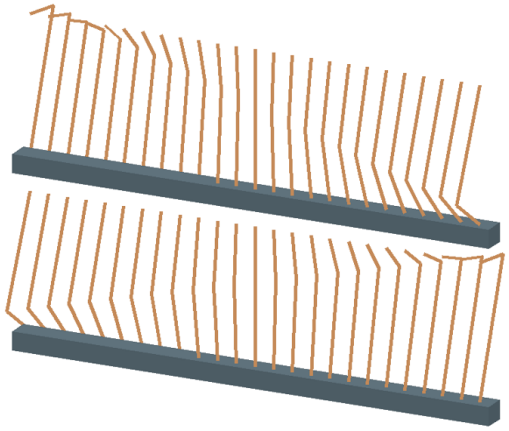
Second material sheet, separate from frames.

Kinked Louvers / visual guide

ORIGINAL SYNTHETIC EXAMPLE

03 Kinked Louvers

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: K0 / K1 / Offset
OUTPUT: Profiles + Axes

Knee moves; top and bottom references stay fixed

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Kinked Louvers

03 / LOUVERS



Bottom and top attachment-reference XY coordinates stay on the guide. Offset moves only the knee. Increasing knee offset does not translate the fixed ends.

Increase the difference between K0 and K1 for a steeper knee-height line. FloorRandom, Kmin and Kmax control differences between floors.

RandomBlendFloors changes the inward/outward blend direction per floor; FadePower controls transition speed along the guide.

Inputs

Guide Curves [C]

ONE connected horizontal guide curve; Item Access. Horizontal facade guide. Tools/Guide Join accepts a flattened list; generators accept ONE joined curve.

Access: Item / Optional input default: internal code default

Floor Count [F]

Number of repeated floor levels, starting at the guide elevation.

Access: Item / Optional input default: 1

Storey Pitch [H]

Vertical distance from one repeated floor datum to the next.

Access: Item / Optional input default: 400

Member Count [N]

Positive value fixes count; zero uses automatic spacing where supported.

Access: Item / Optional input default: 70

Clear Member Gap [Gap]

Requested clear gap in automatic count mode; fixed count may override it.

Access: Item / Optional input default: 20

Section Width [RectW]

External rectangular section width. Refer to this component's local section convention.

Access: Item / Optional input default: 4

Section Depth [RectD]

External rectangular section depth, perpendicular to the local guide.

Access: Item / Optional input default: 6

Kinked Louvers / continued

Wall Thickness [Wall]

Positive values create hollow walls; zero follows this component's filled/default-wall behaviour.

Access: Item / Optional input default: 0.2

Signed Facade Offset [Offset]

Signed plan offset from the guide. Direction and automatic-placement overrides are component-specific.

Access: Item / Optional input default: 30

First Knee Ratio [K0]

Normalized knee height at the first placed member.

Access: Item / Optional input default: 0.6

Last Knee Ratio [K1]

Normalized knee height at the last placed member.

Access: Item / Optional input default: 0.35

Reverse Side [Flip]

Reverses the local side convention; inspect a light preview before full generation.

Access: Item / Optional input default: False

First Floor Outward [FirstOut]

True starts the alternating kink direction outward.

Access: Item / Optional input default: True

Bottom Clearance [BottomGap]

Raises the bottom member attachment above its floor datum.

Access: Item / Optional input default: 0

Top Clearance [TopGap]

Distance below the next repeated floor datum; include beam height where applicable.

Access: Item / Optional input default: 85

Guide End Margin [Margin]

Distance kept clear at the start and end of the guide.

Access: Item / Optional input default: 5

Kinked Louvers / continued

Generate Geometry [Solid]

False uses the lightweight axis/line mode where supported; it does not select material.

Access: Item / Optional input default: True

Floor Randomness [FloorRandom]

Strength of variation between floor knee profiles.

Access: Item / Optional input default: 1

Random Seed [Seed]

Integer seed; the same inputs and seed reproduce the same layout.

Access: Item / Optional input default: 3

Minimum Knee Ratio [Kmin]

Lower limit of randomized knee heights.

Access: Item / Optional input default: 0.3

Maximum Knee Ratio [Kmax]

Upper limit of randomized knee heights.

Access: Item / Optional input default: 0.8

Knee Blend Mode [BendMode]

Selects uniform or smoothly blended inward/outward knee behaviour.

Access: Item / Optional input default: 2

Blend Exponent [FadePower]

Controls how quickly the inward/outward transition reaches full amplitude.

Access: Item / Optional input default: 0.75

Outputs

Axes [Axes]

Member centreline curves; layout helpers, not solid geometry.

Knees [Knees]

Kink/knee points.

Bottom [Bottom]

Lower attachment/end points.

Kinked Louvers / continued

Top [Top]

Upper attachment/end points.

Lengths [Lengths]

Actual member axis lengths in document units.

Calculation Report [Info]

Counts, dimensions, timing, placement conventions and error messages.

Profile Solids [Profiles]

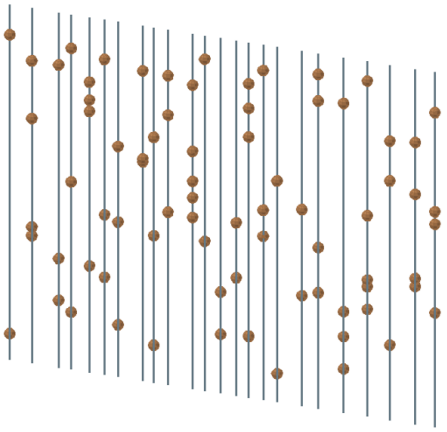
Placed rectangular profile render geometry.

Cables and Beads / visual guide

ORIGINAL SYNTHETIC EXAMPLE

04 Cables and Beads

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: SpacingRandom + Seed
OUTPUT: Cables / Beads

Straight cables; bead centres lie on cable axes

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Cables and Beads

04 / CABLES



All cables are straight, World-Z vertical and equal in height. SpacingRandom changes plan spacing, not cable waviness or length.

Bead centres lie on the cable axes, like beads threaded onto a string. Offset moves the cable/bead assembly together.

BeadCount is requested population; the actual placed count may be lower if clearance constraints prevent placement.

Inputs

Guide Curves [C]

ONE connected horizontal guide curve; Item Access. Horizontal facade guide. Tools/Guide Join accepts a flattened list; generators accept ONE joined curve.

Access: Item / Optional input default: internal code default

Overall Height [Height]

Total vertical extent used by this generator; automatic BetweenFloors placement uses its own clear openings.

Access: Item / Optional input default: 3200

Member Count [N]

Positive value fixes count; zero uses automatic spacing where supported.

Access: Item / Optional input default: 60

Cable Diameter [CableDia]

External diameter of cable render geometry.

Access: Item / Optional input default: 2

Clear Member Gap [Gap]

Requested clear gap in automatic count mode; fixed count may override it.

Access: Item / Optional input default: 15

Spacing Randomness [SpacingRandom]

Strength of irregular cable spacing while retaining straight equal-height cables.

Access: Item / Optional input default: 1

Signed Facade Offset [Offset]

Signed plan offset from the guide. Direction and automatic-placement overrides are component-specific.

Access: Item / Optional input default: 15

Cables and Beads / continued

Reverse Side [Flip]

Reverses the local side convention; inspect a light preview before full generation.

Access: Item / Optional input default: False

Vertical Shift [ZShift]

Adds a vertical translation to the guide datum.

Access: Item / Optional input default: 0

Guide End Margin [Margin]

Distance kept clear at the start and end of the guide.

Access: Item / Optional input default: 10

Bead Count [BeadCount]

Requested number of spherical beads.

Access: Item / Optional input default: 400

Minimum Bead Diameter [BeadDMin]

Lower bound of bead diameters.

Access: Item / Optional input default: 8

Maximum Bead Diameter [BeadDMax]

Upper bound of bead diameters.

Access: Item / Optional input default: 16

Bead Clearance [BeadGap]

Minimum surface clearance between beads.

Access: Item / Optional input default: 10

End Clearance [EndGap]

Clearance between the member ends and their supporting rails or boundaries.

Access: Item / Optional input default: 10

Cluster Strength [Cluster]

Blend between dispersed and clustered placement.

Access: Item / Optional input default: 1

Cables and Beads / continued

Cluster Count [Clusters]

Number of attraction clusters used by the random distribution.

Access: Item / Optional input default: 10

Cluster Spread [ClusterSize]

Relative spread around each cluster centre.

Access: Item / Optional input default: 1

Random Seed [Seed]

Integer seed; the same inputs and seed reproduce the same layout.

Access: Item / Optional input default: 1

Generate Geometry [Solid]

False uses the lightweight axis/line mode where supported; it does not select material.

Access: Item / Optional input default: True

Outputs

Cables [Cables]

Separate cables geometry or layout data. See the component notes.

Beads [Beads]

Separate beads geometry or layout data. See the component notes.

Axes [Axes]

Member centreline curves; layout helpers, not solid geometry.

Bead Points [BeadPts]

Separate bead points geometry or layout data. See the component notes.

Diameters [Diameters]

Placed bead diameters.

Guide [Guide]

Guide actually used after offset/layout operations.

Cables and Beads / continued

Calculation Report [Info]

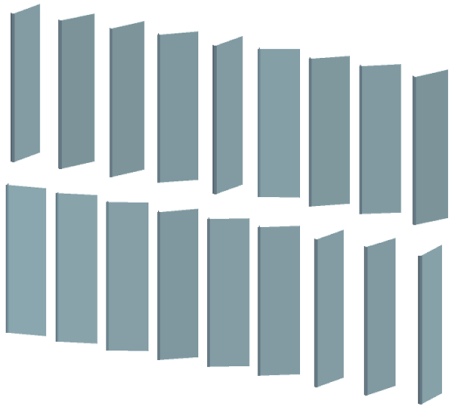
Counts, dimensions, timing, placement conventions and error messages.

Hinged Glass / visual guide

ORIGINAL SYNTHETIC EXAMPLE

05 Hinged Glass

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: AngleMin / AngleMax

OUTPUT: Panels + Hinges

Vertical-edge hinges and independent panel angles

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Hinged Glass

05 / GLASS



Each glass panel turns around a vertical edge like a door hinge. This is not the central-pivot glass system.

AvoidOverlap checks final static panel positions and may retry candidate angles. It does not check the complete opening/closing sweep or collisions with the building.

Inputs

Guide Curves [C]

ONE connected horizontal guide curve; Item Access. Horizontal facade guide. Tools/Guide Join accepts a flattened list; generators accept ONE joined curve.

Access: Item / Optional input default: internal code default

Rod Diameter [RodDia]

External diameter of vertical support rods.

Access: Item / Optional input default: 2

Avoid Static Overlap [AvoidOverlap]

Checks candidate placed panels; does not simulate the full rotation sweep.

Access: Item / Optional input default: True

Panel Clearance [Clearance]

Minimum clearance used by the static overlap check.

Access: Item / Optional input default: 1

Angle Attempt Limit [MaxTries]

Maximum candidate-angle attempts per panel.

Access: Item / Optional input default: 100

Overall Height [Height]

Total vertical extent used by this generator; automatic BetweenFloors placement uses its own clear openings.

Access: Item / Optional input default: 3200

Column Count [Cols]

Positive value overrides automatic column layout; zero enables automatic fitting.

Access: Item / Optional input default: 0

Hinged Glass / continued

Row Count [Rows]

Positive value overrides automatic rows; zero enables automatic fitting.

Access: Item / Optional input default: 0

Panel Width [PanelW]

External panel width, measured along the local facade direction.

Access: Item / Optional input default: 25

Panel Height [PanelH]

External height of each panel.

Access: Item / Optional input default: 45

Horizontal Gap [GapX]

Requested clear spacing in the horizontal layout.

Access: Item / Optional input default: 8

Vertical Gap [GapZ]

Requested spacing between vertically stacked module assemblies.

Access: Item / Optional input default: 8

Panel Thickness [Thickness]

Overall thickness of an individual glass panel.

Access: Item / Optional input default: 2

Signed Facade Offset [Offset]

Signed plan offset from the guide. Direction and automatic-placement overrides are component-specific.

Access: Item / Optional input default: -30

Vertical Shift [ZShift]

Adds a vertical translation to the guide datum.

Access: Item / Optional input default: 0

Guide End Margin [Margin]

Distance kept clear at the start and end of the guide.

Access: Item / Optional input default: 10

Hinged Glass / continued

Minimum Angle [AngleMin]

Lower rotation bound in degrees.

Access: Item / Optional input default: 5

Maximum Angle [AngleMax]

Upper rotation bound in degrees.

Access: Item / Optional input default: 175

Random Seed [Seed]

Integer seed; the same inputs and seed reproduce the same layout.

Access: Item / Optional input default: 2

Reverse Side [Flip]

Reverses the local side convention; inspect a light preview before full generation.

Access: Item / Optional input default: False

Right Edge Hinge [HingeRight]

Chooses the hinged vertical edge of each panel.

Access: Item / Optional input default: False

Generate Geometry [Solid]

False uses the lightweight axis/line mode where supported; it does not select material.

Access: Item / Optional input default: True

Outputs

Panels [Panels]

Separate panels geometry or layout data. See the component notes.

Hinges [Hinges]

Separate hinges geometry or layout data. See the component notes.

Outlines [Outlines]

Separate outlines geometry or layout data. See the component notes.

Centers [Centers]

Placed element centre points.

Hinged Glass / continued

Angles [Angles]

Placed panel rotation angles in degrees.

Guide [Guide]

Guide actually used after offset/layout operations.

Calculation Report [Info]

Counts, dimensions, timing, placement conventions and error messages.

Rods [Rods]

Separate rods geometry or layout data. See the component notes.

Rod Axes [RodAxes]

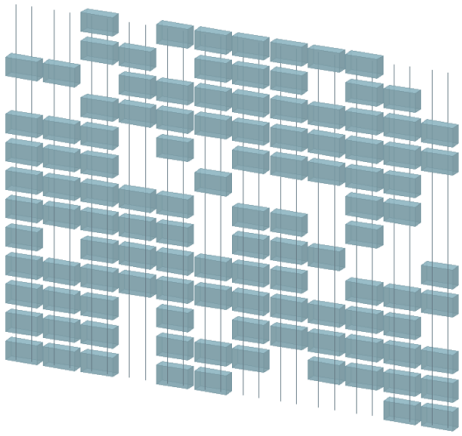
Continuous rod centreline curves.

Glass Bricks / visual guide

ORIGINAL SYNTHETIC EXAMPLE

06 Glass Bricks

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: Density + Cluster

OUTPUT: Glass / Rods

Missing cells are real empty space

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Glass Bricks

06 / GLASS



Fixed glass bricks are supported by two continuous vertical rods per column. Empty cells are actual missing bricks, not dark glass.

DrillHoles generates rod bores where supported; exact drilling can cost more than visually passing rods through the geometry.

Positive Cols/Rows fix counts; zero uses automatic fitting. Density and Cluster govern the occupied-cell pattern.

Inputs

Guide Curves [C]

ONE connected horizontal guide curve; Item Access. Horizontal facade guide. Tools/Guide Join accepts a flattened list; generators accept ONE joined curve.

Access: Item / Optional input default: internal code default

Overall Height [Height]

Total vertical extent used by this generator; automatic BetweenFloors placement uses its own clear openings.

Access: Item / Optional input default: 3200

Column Count [Cols]

Positive value overrides automatic column layout; zero enables automatic fitting.

Access: Item / Optional input default: 0

Row Count [Rows]

Positive value overrides automatic rows; zero enables automatic fitting.

Access: Item / Optional input default: 0

Brick Width [BrickW]

External width of one glass brick.

Access: Item / Optional input default: 40

Brick Height [BrickH]

External height of one glass brick.

Access: Item / Optional input default: 12

Brick Depth [BrickD]

External depth of one glass brick.

Access: Item / Optional input default: 6

Glass Bricks / continued

Horizontal Gap [GapX]

Requested clear spacing in the horizontal layout.

Access: Item / Optional input default: 8

Vertical Gap [GapZ]

Requested spacing between vertically stacked module assemblies.

Access: Item / Optional input default: 4

Signed Facade Offset [Offset]

Signed plan offset from the guide. Direction and automatic-placement overrides are component-specific.

Access: Item / Optional input default: -30

Vertical Shift [ZShift]

Adds a vertical translation to the guide datum.

Access: Item / Optional input default: 0

Guide End Margin [Margin]

Distance kept clear at the start and end of the guide.

Access: Item / Optional input default: 10

Rod Centre Spacing [RodSpacing]

Centre-to-centre spacing of the two rods supporting each module.

Access: Item / Optional input default: 30

Rod Diameter [RodDia]

External diameter of vertical support rods.

Access: Item / Optional input default: 2.2

Population Density [Density]

Fraction of occupied candidate cells or ribbon positions, usually zero to one.

Access: Item / Optional input default: 0.4

Cluster Strength [Cluster]

Blend between dispersed and clustered placement.

Access: Item / Optional input default: 0.1

Glass Bricks / continued

Density Pattern Size [Scale]

Spatial scale of the occupancy pattern.

Access: Item / Optional input default: 10

Random Seed [Seed]

Integer seed; the same inputs and seed reproduce the same layout.

Access: Item / Optional input default: 2

Drill Rod Holes [DrillHoles]

Cuts rod bores when supported; can increase exact-geometry calculation time.

Access: Item / Optional input default: True

Hole Clearance [HoleClear]

Extra clearance around support rods when drilling is enabled.

Access: Item / Optional input default: 0.1

Generate Geometry [Solid]

False uses the lightweight axis/line mode where supported; it does not select material.

Access: Item / Optional input default: True

Outputs

Glass [Glass]

Separate glass geometry or layout data. See the component notes.

Rods [Rods]

Separate rods geometry or layout data. See the component notes.

Rod Axes [RodAxes]

Continuous rod centreline curves.

Centers [Centers]

Placed element centre points.

Outlines [Outlines]

Separate outlines geometry or layout data. See the component notes.

Glass Bricks / continued

Mask [Mask]

Occupancy mask of candidate cells.

Guide [Guide]

Guide actually used after offset/layout operations.

Calculation Report [Info]

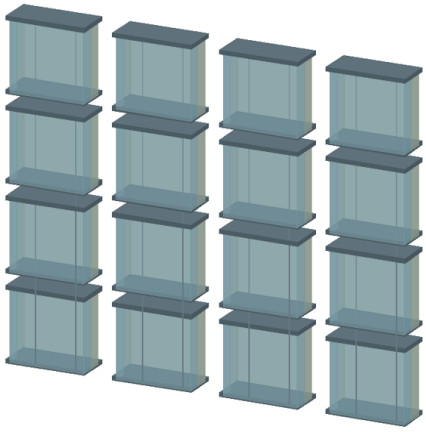
Counts, dimensions, timing, placement conventions and error messages.

Double U Glass / visual guide

ORIGINAL SYNTHETIC EXAMPLE

07 Double U Glass

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: Rows + GapZ
OUTPUT: GlassOuter / GlassInner

Two glass U profiles; caps and rods separate

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Double U Glass

07 / GLASS



Two interlocking U glass profiles have independent GlassOuter and GlassInner outputs. Caps, rods and optional nuts are separate material streams.

BetweenFloors uses a 315 cm clear opening, an 85 cm beam and a 400 cm storey pitch. The assembly has 5 cm clearance from both beams.

Rows and GapZ determine the fitted module height in this mode. Rods extend only through the clear opening, ending below the upper beam.

Automatic signed offsets are -5 cm for Front and +10 cm for BetweenFloors. Manual uses the Offset and Height inputs directly.

Angled orientation options are active only in BetweenFloors. Random angles are shared by the vertically stacked modules in one column on one floor; the next floor can differ.

Quality determines geometry generation. The legacy Solid input is retained for compatibility; Quality is the controlling setting.

Cap thickness is fixed internally at 0.2 cm. CapLip changes its surrounding lip, not vertical thickness. NutScale changes nut body size, while rod bores remain matched to RodDia.

Inputs

Guide Curves [C]

ONE connected horizontal guide curve; Item Access. Horizontal facade guide. Tools/Guide Join accepts a flattened list; generators accept ONE joined curve.

Access: Item / Optional input default: internal code default

Overall Height [Height]

Total vertical extent used by this generator; automatic BetweenFloors placement uses its own clear openings.

Access: Item / Optional input default: 800

Column Count [Cols]

Positive value overrides automatic column layout; zero enables automatic fitting.

Access: Item / Optional input default: 35

Row Count [Rows]

Positive value overrides automatic rows; zero enables automatic fitting.

Access: Item / Optional input default: 7

Double U Glass / continued

Module Width [Width]

Nominal external width of the glass module.

Access: Item / Optional input default: 25

Glass Module Height [ModuleH]

Nominal module height; automatic row fitting may calculate the actual height.

Access: Item / Optional input default: 50

U Flange Depth [Flange]

Depth of the glass U profile flanges.

Access: Item / Optional input default: 6

Glass Thickness [GlassT]

Thickness of each U glass wall.

Access: Item / Optional input default: 0.6

Internal Bend Radius [BendR]

Internal radius of the rounded U glass corners.

Access: Item / Optional input default: 0.8

U Profile Overlap [Overlap]

Desired overlap between opposing glass U profiles.

Access: Item / Optional input default: 0

Signed Facade Offset [Offset]

Signed plan offset from the guide. Direction and automatic-placement overrides are component-specific.

Access: Item / Optional input default: -5

Rod Centre Spacing [RodSpacing]

Centre-to-centre spacing of the two rods supporting each module.

Access: Item / Optional input default: 16

Rod Diameter [RodDia]

External diameter of vertical support rods.

Access: Item / Optional input default: 1

Double U Glass / continued

Show Fixing Nuts [ShowNuts]

Enables or skips nut geometry.

Access: Item / Optional input default: True

Population Mode [Mode]

Value List selects Full, Random or another supported population algorithm.

Access: Item / Optional input default: 0

Population Density [Density]

Fraction of occupied candidate cells or ribbon positions, usually zero to one.

Access: Item / Optional input default: 0.5

Random Seed [Seed]

Integer seed; the same inputs and seed reproduce the same layout.

Access: Item / Optional input default: 1

Generate Geometry [Solid]

False uses the lightweight axis/line mode where supported; it does not select material.

Access: Item / Optional input default: True

Placement Mode [Placement]

Value List selects manual, full-front or between-floor placement.

Access: Item / Optional input default: 1

Placement Floor Count [Floors]

Floor count for automatic placement modes.

Access: Item / Optional input default: 1

Nut Scale [NutScale]

Scale of nut width/height; rod bore remains matched to rod diameter.

Access: Item / Optional input default: 1

Geometry Quality [Quality]

Lines for layout, FastMesh for rendering, ExactBrep for exact surfaces/solids.

Access: Item / Optional input default: 1

Double U Glass / continued

Show Layout Helpers [Helpers]

Enables auxiliary axes, outlines and centres in geometry quality modes.

Access: Item / Optional input default: False

Panel Orientation [Orientation]

Value List selects parallel, perpendicular, diagonal or random orientation where supported.

Access: Item / Optional input default: 3

Vertical Gap [GapZ]

Requested spacing between vertically stacked module assemblies.

Access: Item / Optional input default: 5

Cap Lip Width [CapLip]

Size of the lip surrounding the glass-module cap.

Access: Item / Optional input default: 1

Cap Clearance [CapGap]

Clearance between cap and glass envelope.

Access: Item / Optional input default: 0.1

Horizontal Gap [GapX]

Requested clear spacing in the horizontal layout.

Access: Item / Optional input default: 5

Outputs

Outer U Glass [GlassOuter]

Outer glass U material stream, separate from inner U.

Inner U Glass [GlassInner]

Inner glass U material stream, separate from outer U.

Caps [Caps]

Separate caps geometry or layout data. See the component notes.

Rods [Rods]

Separate rods geometry or layout data. See the component notes.

Double U Glass / continued

Nuts [Nuts]

Separate nuts geometry or layout data. See the component notes.

Rod Axes [RodAxes]

Continuous rod centreline curves.

Centers [Centers]

Placed element centre points.

Outlines [Outlines]

Separate outlines geometry or layout data. See the component notes.

Mask [Mask]

Occupancy mask of candidate cells.

Guide [Guide]

Guide actually used after offset/layout operations.

Calculation Report [Info]

Counts, dimensions, timing, placement conventions and error messages.

Panel Count [PanelCount]

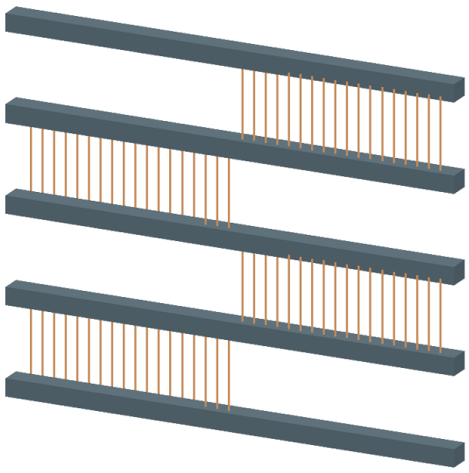
Number of placed panels/modules, not the number of mesh objects.

Half Floor Cables / visual guide

ORIGINAL SYNTHETIC EXAMPLE

08 Half Floor Cables

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: CableDia + Spacing
OUTPUT: Cables + Connections

Alternate the occupied guide half by floor

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Half Floor Cables

08 / CABLES



Eight floors, 315 cm clear openings, 85 cm beams and 400 cm pitch are fixed in this generator. Coverage alternates between guide halves from one floor to the next.

Spacing is centre-to-centre cable pitch. The original design used 11 cm. This is different from the clear surface gap.

Inputs

Guide Curves [C]

ONE connected horizontal guide curve; Item Access. Full U-shaped facade, on the TOP/FRONT edge of the lowest beam.

Access: Item / Optional input default: internal code default

Cable Diameter [CableDia]

External diameter of cable render geometry.

Access: Item / Optional input default: 0.8

Centre Spacing [Spacing]

Cable or louver station pitch along the guide, as specified by this generator.

Access: Item / Optional input default: 11

Outputs

Cables [Cables]

Separate cables geometry or layout data. See the component notes.

Plates [Plates]

Separate plates geometry or layout data. See the component notes.

Fittings [Fittings]

Separate fittings geometry or layout data. See the component notes.

Anchors [Anchors]

Separate anchors geometry or layout data. See the component notes.

Axes [Axes]

Member centreline curves; layout helpers, not solid geometry.

Half Floor Cables / continued

Guide [Guide]

Guide actually used after offset/layout operations.

Cable Count [CableCount]

Number of placed cable axes.

Calculation Report [Info]

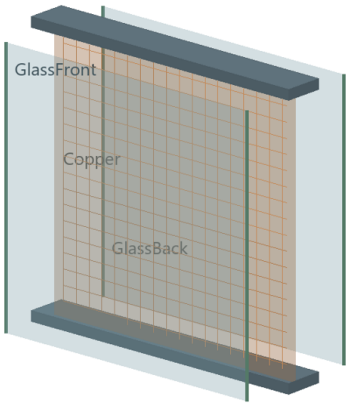
Counts, dimensions, timing, placement conventions and error messages.

Copper Glass Pivots / visual guide

ORIGINAL SYNTHETIC EXAMPLE

09 Copper Glass Pivots

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: FullFrame + SupportMode
OUTPUT: Glass / Edges / Copper

Exploded material layers and open-ended holders

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Copper Glass Pivots

09 / GLASS



Two 1 cm glass sheets contain a thin UV-mapped copper proxy. GlassFront/GlassBack contain broad faces only. GlassEdges contains their complementary narrow edges for an independent green-tinted material. These material parts are intentionally open when inspected separately.

FullFrame switches between a perimeter U frame and two open-ended U holders. HolderH changes the frame/holder band; glass height is fitted automatically. Copper holes are represented by a cutout material, not modeled perforations.

C is the exterior edge, at the top of the lowest 20 cm wide steel beam. Eight floors use 315 cm clear height + 85 cm beam = 400 cm pitch. BetweenBeams mounts at the beam centre, OnBeamEdge aligns the plate outside edge, and OutsideBeam uses the exact magnitude of Offset.

Both direct placements have no continuous front or rear carriers. In OutsideBeam, IndividualBrackets has two original 6x4 cm RHS arms with 8x10 cm beam-face plates per actual panel, and no continuous rail. HiddenRail is 4 cm behind the pivot line. FoldedCover has separate casing and fixing streams.

ContinuousRHS uses ProfileOut for its outer edge projection; panel axes use Offset independently. Offset=ProfileOut/2 puts the axis at the support centre. Do not confuse this control with panel glass width.

CurvedEnds takes one joined vertical C-shaped boundary, mirrors it to the other end and repeats it on all floors. Panels remain vertical; their top and bottom are cut to the boundary. Small pivot footplates stay stationary while panes/holders rotate.

Count is the layout count before omissions. Feasible static angle intervals adapt to the count and are reported separately in AngleRange. Random and alternating signed 45-degree modes use safe intervals. The full rotation sweep and actual building solids are not tested.

RandomGaps=True makes one >=120 cm and one >=60 cm front opening per floor, separated by >=60 cm. False makes one >=150 cm opening controlled by GapPositions (one/eight values 0..1). Whole panels are omitted, so the actual opening is the nearest larger feasible width. TrimEnds removes five panels and hardware at each end when curved ends are off.

BOQ is one CSV-row stream with 16 columns. It includes panels, two glass sheets per panel, copper mass per panel and totals, supports and assumptions. Actual supplier CopperKgM2 overrides the labeled reference estimate. Connect BOQ to D (List) on tools/BOQ_to_Excel_GH_Python3.py, set FilePath, and trigger Write with a Button.

Inputs

Guide Curves [C]

ONE connected horizontal guide at the EXTERIOR edge and TOP of the lowest 20 cm wide steel beam. Centimetres.

Access: Item / Optional input default: internal code default

Copper Glass Pivots / continued

Panel Width [PanelW]

External panel width, measured along the local facade direction.

Access: Item / Optional input default: 25

Holder Height [HolderH]

Height of upper and lower open-ended holders; glass height adjusts automatically.

Access: Item / Optional input default: 6

Panels per Floor [Count]

Requested panel count per floor before openings and end omissions; angles adapt to preserve the count when feasible.

Access: Item / Optional input default: 40

Rotation Angle [Angle]

Angle in degrees relative to the local facade tangent.

Access: Item / Optional input default: 90

Copper Texture Scale [CopperScale]

Changes proxy-sheet UV pattern scale; does not generate perforated metal geometry.

Access: Item / Optional input default: 0.1

Panel Stand-off [Offset]

OutsideBeam: exact outward panel-axis distance from C; negative legacy values use magnitude. Ignored in direct placements.

Access: Item / Optional input default: 15

Full Copper Frame [FullFrame]

True: perimeter U frame. False: upper and lower open-ended U holders.

Access: Item / Optional input default: False

Support Detail [SupportMode]

Value List: ExposedRail=0, HiddenRail=1, IndividualBrackets=2, FoldedCover=3, ContinuousRHS=4. Only OutsideBeam uses continuous carriers.

Access: Item / Optional input default: 2

Rotation Mode [RotationMode]

FixedAngle=0, Random=1, Alternate45=2. Count-safe static angles; fixed footplates never rotate.

Access: Item / Optional input default: 0

Copper Glass Pivots / continued

Minimum Angle [AngleMin]

Lower requested random-angle bound in degrees; count and envelope clearances may restrict the feasible bands.

Access: Item / Optional input default: -90

Maximum Angle [AngleMax]

Upper requested random-angle bound in degrees. See AngleRange for certified static intervals.

Access: Item / Optional input default: 90

Random Seed [Seed]

Repeatable random rotations and opening locations.

Access: Item / Optional input default: 1

Copper Areal Mass [CopperKgM2]

Actual supplier mass in kg/m2. Zero uses the labeled reference estimate; the proxy is not a solid-copper weight model.

Access: Item / Optional input default: 0

Paired Random Openings [RandomGaps]

True: one >=120 cm and one >=60 cm front opening per floor, with >=60 cm separation. False: one >=150 cm opening controlled by GapPositions. Whole panels are omitted.

Access: Item / Optional input default: False

Trim Five End Panels [TrimEnds]

True omits five panels at each guide end plus their hardware. Ignored when CurvedEnds=True.

Access: Item / Optional input default: False

Floor Opening Positions [GapPositions]

LIST: one or eight values 0..1, bottom to top. Used for the single >=150 cm opening; empty uses seeded placement.

Access: List / Optional input default: internal code default

Opposed Rail Gap [RailGap]

Requested vertical clear rail gap in cm, default 73. Effective gap is clipped for beam overlap; panel height adjusts.

Access: Item / Optional input default: 73

Curved Elevation Ends [CurvedEnds]

Enable one supplied vertical return boundary, mirrored automatically to both ends on all eight floors.

Access: Item / Optional input default: False

Copper Glass Pivots / continued

Elevation Return Curve [EndCurve]

ONE joined vertical open C-shaped rail boundary, full source clear height; required only when CurvedEnds=True.

Access: Item / Optional input default: internal code default

Beam Attachment Placement [Placement]

BetweenBeams=0: centre of 20 cm beam. OnBeamEdge=1: plate outer edge aligned to C. OutsideBeam=2: stand-off controlled by Offset. Direct modes have no perimeter rails.

Access: Item / Optional input default: 0

Continuous RHS Projection [ProfileOut]

OutsideBeam + ContinuousRHS only: outer edge projection from C, independent of Offset. For centred panel axes use Offset=ProfileOut/2.

Access: Item / Optional input default: 30

Outputs

Glass Front [GlassFront]

Broad faces ONLY of the front 1 cm glass sheet; combine with GlassEdges to complete its material envelope.

Glass Back [GlassBack]

Broad faces ONLY of the back 1 cm glass sheet; edges are in GlassEdges.

Copper Sheets [Copper]

Thin copper proxy sheets with UV mapping; apply mesh/cutout material separately.

Holders [Holders]

Upper/lower open-ended U holders when FullFrame=False. Empty with full perimeter frame.

Pivots [Pivots]

Separate pivots geometry or layout data. See the component notes.

Axes [Axes]

Member centreline curves; layout helpers, not solid geometry.

Centers [Centers]

Placed element centre points.

Copper Glass Pivots / continued

Guide [Guide]

Guide actually used after offset/layout operations.

Panel Count [PanelCount]

Number of placed panels/modules, not the number of mesh objects.

Glass Height [GlassHeight]

Actual glass height in cm: scalar for normal ends, list per surviving panel for curved ends.

Calculation Report [Info]

Counts, dimensions, timing, placement conventions and error messages.

Glass Edge Faces [GlassEdges]

Four narrow edge faces of BOTH 1 cm glass sheets, independent material. Complementary to GlassFront/GlassBack.

Perimeter Frames [Frames]

Perimeter U frames only when FullFrame=True; separate copper/metal material.

Support Rails [Rails]

Continuous carriers only for OutsideBeam support modes that need them. Empty for IndividualBrackets and direct placements.

Individual Supports [Brackets]

Actual top/bottom supports; original 6x4 RHS arms and 8x10 faceplates in IndividualBrackets.

Folded Sheet Covers [Covers]

FoldedCover casing covering the carrier/brackets; separate finish.

Cover Fasteners [CoverFixings]

Independent clips/fasteners for folded covers.

Quantity Schedule CSV [BOQ]

One CSV row list, 16 columns: totals, per-panel copper mass, materials, fabrication and assumptions. Connect to the bundled Excel exporter (D List).

Copper Glass Pivots / continued

Feasible Angle Ranges [AngleRange]

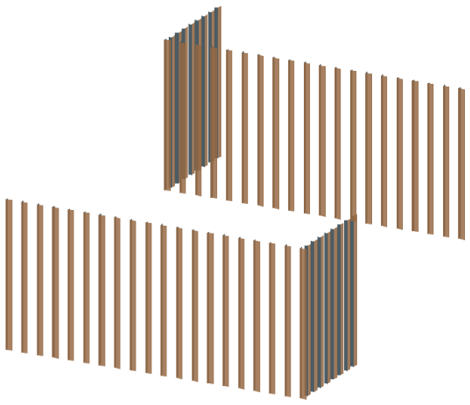
One text line reporting certified static angle intervals at the requested count; separated bands stay separate.

Return Louvers / visual guide

ORIGINAL SYNTHETIC EXAMPLE

10 Return Louvers

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: ReturnDepth + MidShift
OUTPUT: Frames + Returns

Front bands turn inward with alternating layout

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Return Louvers

10 / LOUVERS



Alternating bands have a front part, side bands and an inward return. ReturnDepth controls the return length; Drop and TopOffset control vertical boundary extensions.

CornerR controls selected elevation boundary fillets. ReturnR controls the rounded plan return; zero keeps a sharp return.

MidShift moves the middle boundary in alternating directions between floors. Station spacing runs continuously along the return instead of restarting at each curve segment.

Inputs

Guide Curves [C]

ONE connected horizontal guide curve; Item Access. Full U-shaped facade, on the TOP/FRONT edge of the lowest beam.

Access: Item / Optional input default: internal code default

Floor Count [F]

Number of repeated floor levels, starting at the guide elevation.

Access: Item / Optional input default: 1

Centre Spacing [Spacing]

Cable or louver station pitch along the guide, as specified by this generator.

Access: Item / Optional input default: 15

Section Width [RectW]

External rectangular section width. Refer to this component's local section convention.

Access: Item / Optional input default: 3

Section Depth [RectD]

External rectangular section depth, perpendicular to the local guide.

Access: Item / Optional input default: 10

Wall Thickness [Wall]

Positive values create hollow walls; zero follows this component's filled/default-wall behaviour.

Access: Item / Optional input default: 0.1

Return Length [ReturnDepth]

Length of the return into the facade depth.

Access: Item / Optional input default: 200

Return Louvers / continued

Lower Extension [Drop]

Extension below the supporting beam or base boundary.

Access: Item / Optional input default: 40

Front Facade Offset [FacadeOffset]

Moves the facade assembly relative to the reference guide.

Access: Item / Optional input default: 5

Side Band Width [SideBand]

Width of the permanently covered side band.

Access: Item / Optional input default: 340

First Floor Right [FirstRight]

Chooses the first side of an alternating left/right arrangement.

Access: Item / Optional input default: True

Reverse Side [Flip]

Reverses the local side convention; inspect a light preview before full generation.

Access: Item / Optional input default: False

Generate Geometry [Solid]

False uses the lightweight axis/line mode where supported; it does not select material.

Access: Item / Optional input default: True

Upper Extension [TopOffset]

Controls the upper boundary extension of the louver band.

Access: Item / Optional input default: 190

Boundary Corner Radius [CornerR]

Fillet radius at the selected elevation boundary corners.

Access: Item / Optional input default: 110

Middle Boundary Shift [MidShift]

Moves the middle boundary; direction alternates with the floors.

Access: Item / Optional input default: 22

Return Louvers / continued

Return Radius [ReturnR]

Plan return fillet radius; zero retains a sharp return.

Access: Item / Optional input default: 0

Outputs

Front Face Sheets [Front]

First material sheet, separate from frames.

Returns [Returns]

Separate returns geometry or layout data. See the component notes.

Side Bands [SideBands]

Separate side bands geometry or layout data. See the component notes.

Axes [Axes]

Member centreline curves; layout helpers, not solid geometry.

Guide [Guide]

Guide actually used after offset/layout operations.

Return Guides [ReturnGuides]

Separate return guides geometry or layout data. See the component notes.

Louver Count [LouverCount]

Number of generated louver members.

Calculation Report [Info]

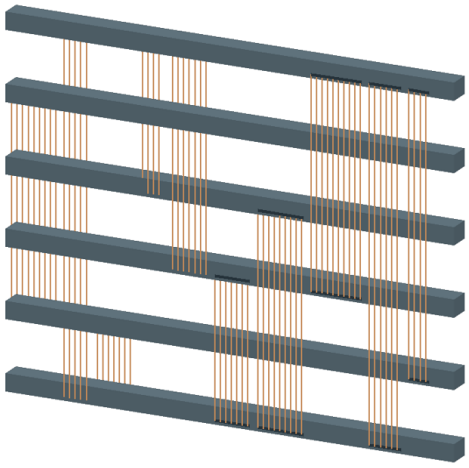
Counts, dimensions, timing, placement conventions and error messages.

Random Cable Spans / visual guide

ORIGINAL SYNTHETIC EXAMPLE

11 Random Cable Spans

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: MinSpan / MaxSpan / Seed
OUTPUT: Cables + Fittings

Random groups connect different beam levels

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Random Cable Spans

11 / CABLES



Random-width cable groups span from one beam-centre level to another, in front of the beams. They are not constrained to a single clear opening.

MinSpan=1 permits adjacent beam levels. MaxSpan is limited by available floors and can span the full building.

Randomness=0 preserves the original sequential placement. Randomness=1 uses independent start levels and free beam-to-beam runs; intermediate values mix both.

Density is an approximate occupancy target, not an exact facade coverage guarantee. Connection geometry is conceptual/render-scale.

Inputs

Guide Curves [C]

ONE connected horizontal guide curve; Item Access. Full U-shaped facade, on the TOP/FRONT edge of the lowest beam.

Access: Item / Optional input default: internal code default

Floor Count [F]

Number of repeated floor levels, starting at the guide elevation.

Access: Item / Optional input default: 1

Cable Diameter [CableDia]

External diameter of cable render geometry.

Access: Item / Optional input default: 0.8

Centre Spacing [Spacing]

Cable or louver station pitch along the guide, as specified by this generator.

Access: Item / Optional input default: 11

Minimum Group Width [WidthMin]

Lower bound of random ribbon or cable-group widths.

Access: Item / Optional input default: 50

Maximum Group Width [WidthMax]

Upper bound of random ribbon or cable-group widths.

Access: Item / Optional input default: 120

Random Cable Spans / continued

Group Gap [GroupGap]

Clear spacing reserved between adjacent groups.

Access: Item / Optional input default: 2

Minimum Floor Span [MinSpan]

Minimum number of storey intervals between cable-group attachments.

Access: Item / Optional input default: 1

Maximum Floor Span [MaxSpan]

Maximum storey intervals spanned, limited by available floors.

Access: Item / Optional input default: 4

Population Density [Density]

Fraction of occupied candidate cells or ribbon positions, usually zero to one.

Access: Item / Optional input default: 0.75

Signed Facade Offset [Offset]

Signed plan offset from the guide. Direction and automatic-placement overrides are component-specific.

Access: Item / Optional input default: 10

Reverse Side [Flip]

Reverses the local side convention; inspect a light preview before full generation.

Access: Item / Optional input default: False

Random Seed [Seed]

Integer seed; the same inputs and seed reproduce the same layout.

Access: Item / Optional input default: 5

Connection Detail [Details]

Enables or skips render-scale connection geometry.

Access: Item / Optional input default: True

Generate Geometry [Solid]

False uses the lightweight axis/line mode where supported; it does not select material.

Access: Item / Optional input default: True

Random Cable Spans / continued

Random Strength [Randomness]

Strength of random variation. Seed chooses a reproducible arrangement.

Access: Item / Optional input default: 0.8

Outputs

Cables [Cables]

Separate cables geometry or layout data. See the component notes.

Mounts [Mounts]

Separate mounts geometry or layout data. See the component notes.

Fittings [Fittings]

Separate fittings geometry or layout data. See the component notes.

Axes [Axes]

Member centreline curves; layout helpers, not solid geometry.

Panel Outlines [PanelOutlines]

Separate panel outlines geometry or layout data. See the component notes.

Guide [Guide]

Guide actually used after offset/layout operations.

Panel Count [PanelCount]

Number of placed panels/modules, not the number of mesh objects.

Cable Count [CableCount]

Number of placed cable axes.

Panel Data [PanelData]

Per-group span, width and placement data.

Calculation Report [Info]

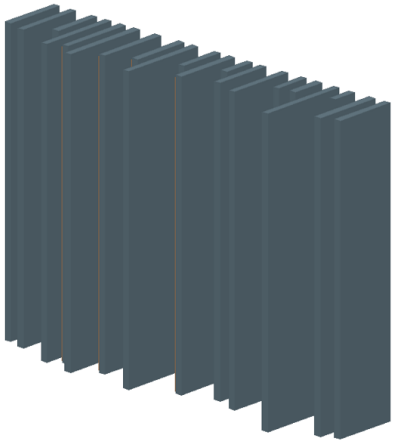
Counts, dimensions, timing, placement conventions and error messages.

Density U Panels / visual guide

ORIGINAL SYNTHETIC EXAMPLE

12 Density U Panels

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: FaceW + DepthMin/Max
OUTPUT: Frames / Copper / Chrome

Common rear reference; variable outward depth

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Density U Panels

12 / SCREENS



A perimeter U frame and two opposite side sheets replace the former solid box. Frame wall thickness is fixed at 0.2 cm.

The 10 x 10 cm support rail is at beam mid-height. EndGap is clearance from the rail, not an end cap.

Copper and Chrome are plain sheets for separate materials. No expanded-metal holes are modeled. Depth increases toward the exterior.

Inputs

Guide Curves [C]

ONE connected horizontal guide curve; Item Access. Full U-shaped facade, on the TOP/FRONT edge of the lowest beam.

Access: Item / Optional input default: internal code default

Floor Count [F]

Number of repeated floor levels, starting at the guide elevation.

Access: Item / Optional input default: 1

Minimum Depth [DepthMin]

Lower bound of the depth distribution.

Access: Item / Optional input default: 10

Maximum Depth [DepthMax]

Upper bound of the depth distribution.

Access: Item / Optional input default: 40

Minimum Gap [GapMin]

Lower bound of the varying clear spacing.

Access: Item / Optional input default: 10

Maximum Gap [GapMax]

Upper bound of the varying clear spacing.

Access: Item / Optional input default: 30

Density Contrast [DensityStrength]

Contrast between dense and sparse facade zones.

Access: Item / Optional input default: 3

Density U Panels / continued

Pattern Scale [PatternScale]

Spatial size or frequency of the density pattern.

Access: Item / Optional input default: 10

Density Floor Variation [FloorVariation]

Strength of per-floor density variation.

Access: Item / Optional input default: 1

Depth Variation [DepthRandom]

Strength of independent depth variation.

Access: Item / Optional input default: 1

End Clearance [EndGap]

Clearance between the member ends and their supporting rails or boundaries.

Access: Item / Optional input default: 3

Signed Facade Offset [Offset]

Signed plan offset from the guide. Direction and automatic-placement overrides are component-specific.

Access: Item / Optional input default: 10

Random Seed [Seed]

Integer seed; the same inputs and seed reproduce the same layout.

Access: Item / Optional input default: 8

Connection Detail [Details]

Enables or skips render-scale connection geometry.

Access: Item / Optional input default: True

Visible Face Width [FaceW]

Visible width of a louver or its frame band, according to the component detail.

Access: Item / Optional input default: 5

Outputs

Rails [Rails]

Supporting rail geometry; separate from members.

Density U Panels / continued

Connectors [Connectors]

Render-scale rail/member connectors; separate material stream.

Perimeter Frames [Frames]

Frame material geometry; separate from copper/chrome face sheets.

Copper Sheets [Copper]

Thin copper proxy sheets with UV mapping; apply mesh/cutout material separately.

Chrome Sheets [Chrome]

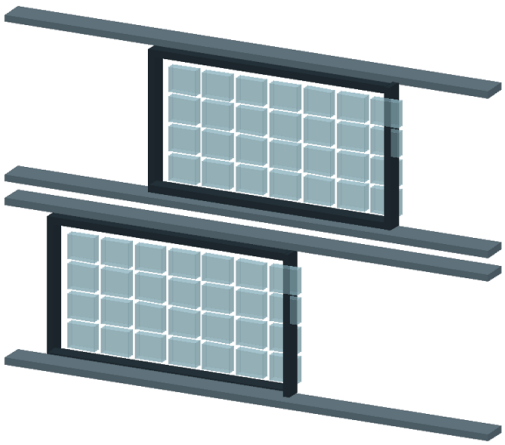
Separate metal/chrome face geometry.

Sliding Facade / visual guide

ORIGINAL SYNTHETIC EXAMPLE

13 Sliding Facade

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: Positions [List]
OUTPUT: Frames / Tracks / Infill

Independent floor positions; fixed straight tracks

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Sliding Facade

13 / SLIDING



The longest straight front segment is used for sliding travel; corners are not part of the moving rail. There is one sliding frame per floor.

Clear height is 315 cm and pitch is 400 cm. The frame occupies relative Z=12..307 cm; rails and guides remain over the beam.

The allowed rail-centre Offset is -13..-7 cm. Use -10 cm for the centre of the 20 cm wide beam.

Positions is a List from the bottom floor upward. Zero and one select the travel ends. One value broadcasts; missing values default to 0.5.

ShowModules=False skips moving infill generation for fast sliding. In CopperLouvers mode, the fixed curved and side-return fins remain visible.

LouverDepth may exceed frame depth. Only additional fin depth projects outward; the rail and frame do not move outside the beam.

ModuleW and ModuleH apply to GlassBoxes only. FaceW, LouverDepth and LouverGap apply to CopperLouvers.

Inputs

Guide Curves [C]

ONE connected horizontal guide curve; Item Access. Full U-shaped facade, on the TOP/FRONT edge of the lowest beam.

Access: Item / Optional input default: internal code default

Floor Count [F]

Number of repeated floor levels, starting at the guide elevation.

Access: Item / Optional input default: 1

Panel Width [PanelW]

External panel width, measured along the local facade direction.

Access: Item / Optional input default: 500

Floor Slide Positions [Positions]

LIST from bottom floor upward; zero=start, one=end. One value broadcasts; missing values use 0.5.

Access: List / Optional input default: internal code default

Show Moving Infill [ShowModules]

False skips moving infill generation for responsive sliding; fixed side fins may remain.

Access: Item / Optional input default: True

Sliding Facade / continued

Glass Module Width [ModuleW]

Nominal width of infill glass boxes; used by GlassBoxes mode only.

Access: Item / Optional input default: 25

Glass Module Height [ModuleH]

Nominal module height; automatic row fitting may calculate the actual height.

Access: Item / Optional input default: 50

Signed Facade Offset [Offset]

Signed plan offset from the guide. Direction and automatic-placement overrides are component-specific. Rail centre stays on the 20 cm beam at -10 cm; negative is inward.

Access: Item / Optional input default: -10

Infill Type [Infill]

Value List selects GlassBoxes or CopperLouvers.

Access: Item / Optional input default: 1

Visible Face Width [FaceW]

Visible width of a louver or its frame band, according to the component detail.

Access: Item / Optional input default: 5

Moving Louver Depth [LouverDepth]

Extra depth grows toward the facade exterior; rail and frame stay over the beam.

Access: Item / Optional input default: 30

Moving Louver Gap [LouverGap]

Clear gap between adjacent moving louvers.

Access: Item / Optional input default: 22

Outputs

Perimeter Frames [Frames]

Frame material geometry; separate from copper/chrome face sheets.

Tracks [Tracks]

Fixed running rails and upper guides; these do not slide.

Sliding Facade / continued

Mechanism [Mechanism]

Rollers, retainers and render-scale mechanism parts.

Outer U Glass [GlassOuter]

Outer glass U material stream, separate from inner U.

Inner U Glass [GlassInner]

Inner glass U material stream, separate from outer U.

Module Metal [ModuleMetal]

Separate module metal geometry or layout data. See the component notes.

Copper Sheets [Copper]

Thin copper proxy sheets with UV mapping; apply mesh/cutout material separately.

Chrome Sheets [Chrome]

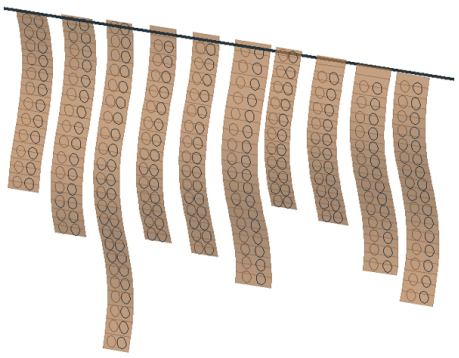
Separate metal/chrome face geometry.

Ring Curtains / visual guide

ORIGINAL SYNTHETIC EXAMPLE

14 Ring Curtains

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: Density + Wind + Time
OUTPUT: Curtains + Supports

Light ribbons use a chain/ring cutout material

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Ring Curtains

14 / SCREENS



Curtains are lightweight UV-mapped ribbons, not individual interlocking chain rings. A cutout/opacity material creates the chainmail appearance.

Wind and Time create procedural visual displacement. This is not a physical wind, structural or collision simulation.

Density, random width and random ribbon length control the distribution across the facade.

Inputs

Guide Curves [C]

ONE connected horizontal guide curve; Item Access. Full U-shaped facade, on the TOP/FRONT edge of the lowest beam.

Access: Item / Optional input default: internal code default

Floor Count [F]

Number of repeated floor levels, starting at the guide elevation.

Access: Item / Optional input default: 1

Minimum Group Width [WidthMin]

Lower bound of random ribbon or cable-group widths.

Access: Item / Optional input default: 50

Maximum Group Width [WidthMax]

Upper bound of random ribbon or cable-group widths.

Access: Item / Optional input default: 120

Minimum Ribbon Length [LengthMin]

Lower bound of hanging curtain-ribbon length.

Access: Item / Optional input default: 180

Maximum Ribbon Length [LengthMax]

Upper bound of hanging curtain-ribbon length.

Access: Item / Optional input default: 300

Population Density [Density]

Fraction of occupied candidate cells or ribbon positions, usually zero to one.

Access: Item / Optional input default: 1

Ring Curtains / continued

Signed Facade Offset [Offset]

Signed plan offset from the guide. Direction and automatic-placement overrides are component-specific.

Access: Item / Optional input default: -10

Random Seed [Seed]

Integer seed; the same inputs and seed reproduce the same layout.

Access: Item / Optional input default: 10

Wind Amplitude [Wind]

Amplitude of procedural curtain displacement; this is not a physical wind solver.

Access: Item / Optional input default: 10

Animation Time [Time]

Changes the phase of procedural curtain motion.

Access: Item / Optional input default: 20

Outputs

Curtain Ribbons [Curtains]

Light UV-mapped ribbon meshes; ring appearance comes from an opacity material.

Supports [Supports]

Separate supports geometry or layout data. See the component notes.

Tethers [Tethers]

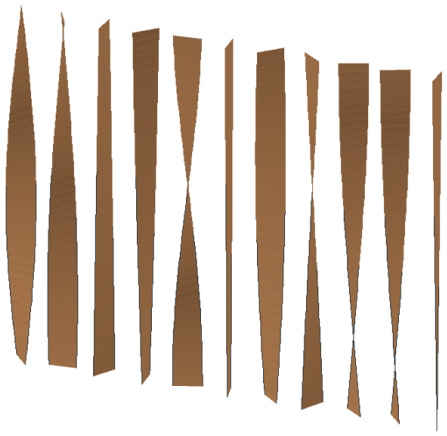
Separate tethers geometry or layout data. See the component notes.

Twisted Ribbons / visual guide

ORIGINAL SYNTHETIC EXAMPLE

15 Twisted Ribbons

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: TwistMin / TwistMax
OUTPUT: Bronze / DarkMetal

Section rotation changes along the ribbon

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Twisted Ribbons

15 / SCREENS



Width is ribbon width, not glass-module width. Twist is applied along each ribbon.

Bronze and DarkMetal are complementary face/edge streams. Either output may intentionally be open when inspected alone. Together they form the thin ribbon assembly.

Inputs

Guide Curves [C]

ONE connected horizontal guide curve; Item Access. Full U-shaped facade, on the TOP/FRONT edge of the lowest beam.

Access: Item / Optional input default: internal code default

Floor Count [F]

Number of repeated floor levels, starting at the guide elevation.

Access: Item / Optional input default: 1

Module Width [Width]

External ribbon width in centimetres.

Access: Item / Optional input default: 20

Clear Member Gap [Gap]

Requested clear gap in automatic count mode; fixed count may override it.

Access: Item / Optional input default: 6

Group Gap [GroupGap]

Clear spacing reserved between adjacent groups.

Access: Item / Optional input default: 30

Minimum Twist [TwistMin]

Lower bound of ribbon twist, in degrees.

Access: Item / Optional input default: 90

Maximum Twist [TwistMax]

Upper bound of ribbon twist, in degrees.

Access: Item / Optional input default: 360

Twisted Ribbons / continued

Random Strength [Randomness]

Strength of random variation. Seed chooses a reproducible arrangement.

Access: Item / Optional input default: 1

Signed Facade Offset [Offset]

Signed plan offset from the guide. Direction and automatic-placement overrides are component-specific.

Access: Item / Optional input default: -10

Random Seed [Seed]

Integer seed; the same inputs and seed reproduce the same layout.

Access: Item / Optional input default: 10

Outputs

Bronze Ribbon Faces [Bronze]

Open bronze side mesh; opposing faces/edges are in DarkMetal.

Dark Ribbon Faces [DarkMetal]

Complementary dark ribbon faces and edges; individual stream may be open.

Connections [Connections]

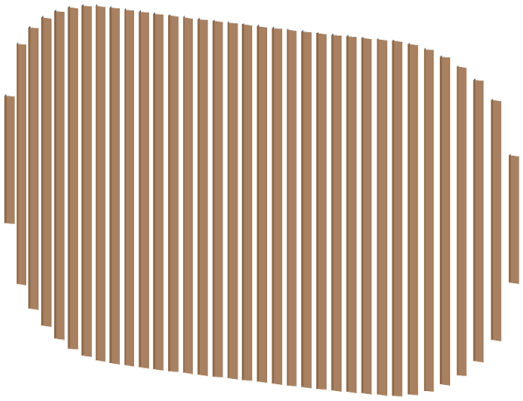
Render-scale connection parts; separate material stream.

Filleted Corner Fins / visual guide

ORIGINAL SYNTHETIC EXAMPLE

16 Filleted Corner Fins

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: Radius + FaceW + Gap
OUTPUT: Frames / Copper / Chrome

Straight fins; filleted collective end boundary

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Filleted Corner Fins

16 / LOUVERS



Both plan curves and both straight side returns are populated. Collective elevation boundaries are filleted on both sides on every floor.

Individual fins stay straight: only the overall upper/lower end boundary is filleted, rather than bending one fin into a C shape.

One Radius controls all corresponding boundary fillets. The original setting was 110 cm; allowed values depend on clear height and member dimensions.

FirstRight was ignored in the both-sides variant and has been removed from this interface. Frames, Copper, Chrome and Connections remain separate.

Inputs

Guide Curves [C]

ONE connected horizontal guide curve; Item Access. Full U-shaped facade, on the TOP/FRONT edge of the lowest beam.

Access: Item / Optional input default: internal code default

Floor Count [F]

Number of repeated floor levels, starting at the guide elevation.

Access: Item / Optional input default: 1

Visible Face Width [FaceW]

Visible width of a louver or its frame band, according to the component detail.

Access: Item / Optional input default: 5

Louver Depth [Depth]

Overall louver depth. Extra depth projects toward the exterior where specified.

Access: Item / Optional input default: 30

Clear Member Gap [Gap]

Requested clear gap in automatic count mode; fixed count may override it.

Access: Item / Optional input default: 11

Boundary Fillet Radius [Radius]

One shared radius trims upper and lower collective fin boundaries.

Access: Item / Optional input default: 110

Filleted Corner Fins / continued

Signed Facade Offset [Offset]

Signed plan offset from the guide. Direction and automatic-placement overrides are component-specific. Rail centre stays on the 20 cm beam at -10 cm; negative is inward.

Access: Item / Optional input default: -10

Outputs

Perimeter Frames [Frames]

Frame material geometry; separate from copper/chrome face sheets.

Copper Sheets [Copper]

Thin copper proxy sheets with UV mapping; apply mesh/cutout material separately.

Chrome Sheets [Chrome]

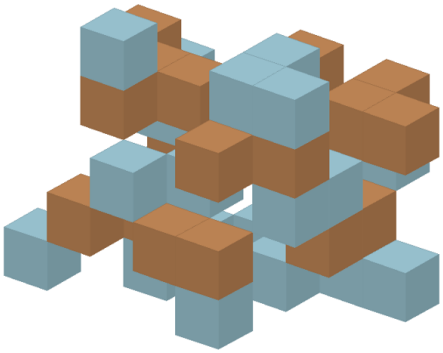
Separate metal/chrome face geometry.

Connections [Connections]

Render-scale connection parts; separate material stream.

17 Life Lab 3D

ORIGINAL SYNTHETIC EXAMPLE / AEGIS



INPUT: Rule + Seed + Step
OUTPUT: Boxes / Ages / History

26-neighbour volumetric evolution; 3 m cells

Illustrative geometry generated specifically for this manual. Use the input reference on the following pages to control the actual component.

Life Lab 3D

17 / FORM FINDING



Life Lab 3D is a volumetric cellular automaton, not a machine-learning model and not the 2D Conway rule. Every update considers the 26 neighbouring cells and updates the full 3D state simultaneously.

Start with Nx=8, Ny=8, Nz=6, VoxelM=3, Pattern=0, Density=0.25, Seed=8, Rule="B6/S5,6,7,8". Run=False pauses. Reset and Step should be Buttons. Run=True animates without an external Timer. The dedicated example opens paused.

VoxelM is always metres. In a centimetre Rhino document each default cube is 300 model units; in millimetres it is 3000. Facade components elsewhere in AEGIS retain their centimetre-only convention. UnitsPerMeter overrides conversion only when explicitly supplied.

Pattern=3 uses StartPts as a LIST of full 3D points in the oriented grid. Plane sets the origin and axes; the grid extends in its positive X/Y/Z directions. Outside points are ignored and reported. Changing rule/grid/seed resets the engine.

Rule counts are comma-separated integers 0..26: B10 means ten neighbours. Grounded retains face-connected paths to the grid bottom; it does not establish structural stability. Wrap affects neighbour counts across boundaries.

Boxes is the primary preview. Connect Boxes + Colors to Custom Preview for age colours. Breps, Mesh, States, History and HistoryAges are built only when their output has a downstream recipient, keeping animation lighter.

Mesh removes internal voxel faces but edge/corner-only contacts can still make non-manifold topology; it is not a guaranteed fabrication solid. Breps outputs one closed cube per living cell.

Record stores session-only snapshots. Pause, inspect Recorded, and set ViewGen to an available generation; -1 returns to live. Viewing history does not rewind the engine. Histories and ages are not restored by saving/reopening GH; bake/export selected geometry if required.

MaxGen=0 is unlimited. AutoStop checks exact occupancy cycles within 64 recent states. Nx,Ny,Nz are 3..60 with product <=125000; history capacity is min(HistoryLimit,max(1,200000//grid-cell-count)). Each component/document has isolated state.

Inputs

Run Simulation [Run]

Toggle automatic stepping; no external Timer. Default False.

Access: Item / Optional input default: False

Reset Simulation [Reset]

Button: reset to the configured seed.

Access: Item / Optional input default: False

Life Lab 3D / continued

Single Generation [Step]

Button: advance one generation while Run=False.

Access: Item / Optional input default: False

Grid Cells X [Nx]

Integer 3..60. Nx*Ny*Nz must not exceed 125000.

Access: Item / Optional input default: 20

Grid Cells Y [Ny]

Integer 3..60. Nx*Ny*Nz must not exceed 125000.

Access: Item / Optional input default: 20

Grid Cells Z [Nz]

Integer 3..60. Nx*Ny*Nz must not exceed 125000.

Access: Item / Optional input default: 12

Voxel Edge in Metres [VoxelM]

Cube edge IN METRES, default 3. Converted automatically to Rhino document units.

Access: Item / Optional input default: 3

Grid Base Plane [Plane]

Oriented grid origin and axes; elevation follows plane normal. Default WorldXY.

Access: Item / Optional input default: internal code default

Initial Pattern [Pattern]

CompactNoise=0; FullNoise=1; SolidCore=2; SeedPoints=3.

Access: Item / Optional input default: 0

Initial Density [Density]

Initial occupancy probability 0..1 for random patterns; does not constrain future generations.

Access: Item / Optional input default: 0.25

Random Seed [Seed]

Repeatable integer random seed; zero is valid.

Access: Item / Optional input default: 8

Life Lab 3D / continued

Birth and Survival Rule [Rule]

26-neighbour rule, e.g. B6/S5,6,7,8. Counts 0..26 separated by commas; B10 means ten.

Access: Item / Optional input default: B6/S5,6,7,8

Wrap Grid Boundaries [Wrap]

Wrap all three axes for neighbour counts.

Access: Item / Optional input default: False

Ground Connectivity Filter [Grounded]

Keep only face-connected paths to z=0. This is geometric connectivity, not structural analysis.

Access: Item / Optional input default: False

Step Interval ms [Interval]

Milliseconds 30..10000; default 200.

Access: Item / Optional input default: 200

Generation Limit [MaxGen]

Stop at this generation. Zero means unlimited.

Access: Item / Optional input default: 100

Stop on Stable or Cycle [AutoStop]

Stop on exact occupancy repeat in the last 64 states; manual Step can still inspect further states.

Access: Item / Optional input default: True

Record Generations [Record]

Store bounded session-only history. False clears the retained history.

Access: Item / Optional input default: True

Retained Generation Limit [HistoryLimit]

Requested retained snapshots 1..1000, further bounded by grid memory budget.

Access: Item / Optional input default: 40

Displayed Generation [ViewGen]

-1 shows live generation; otherwise show a retained snapshot without rewinding the engine.

Access: Item / Optional input default: -1

Life Lab 3D / continued

Initial Seed Points [StartPts]

LIST of full 3D points used only in Pattern=3. Outside-grid points are ignored and reported.

Access: List / Optional input default: internal code default

Manual Units per Metre [UnitsPerMeter]

Optional override: metre=1, centimetre=100, millimetre=1000. Leave empty for auto units.

Access: Item / Optional input default: internal code default

Outputs

Live Voxel Boxes [Boxes]

Oriented full voxel boxes; primary lightweight preview.

Voxel Solid Breps [Breps]

Closed voxel Breps. Built only when this output has a recipient.

Exposed Boundary Mesh [Mesh]

Boundary quads with internal faces omitted; built only when connected. Edge/corner contacts can be non-manifold.

Voxel Centres [Points]

Cell centres, aligned with Boxes, Colors, Ages and Indices.

Age Colours [Colors]

Age colours aligned with Boxes for Custom Preview.

Cell Ages [Ages]

Consecutive live age; born and initial cells have age 1.

Live Linear Indices [Indices]

x + Nx*(y + Ny*z), ordered by z then y then x.

Complete Grid Box [Bounds]

Box enclosing the entire allowed grid including empty cells; helper preview disabled.

Grid Occupancy Tree [States]

DataTree[int] paths {z;y}, Nx zeros/ones in each row; only built when connected.

Life Lab 3D / continued

Live Generation [Generation]

Current simulation generation, independent of historical viewing.

Displayed Generation [DisplayedGen]

Generation whose geometry and quantities are currently output.

Live Voxel Count [Population]

Displayed population count.

Voxel Volume m3 [VolumeM3]

Displayed population * VoxelM cubed, always in cubic metres.

Detected Cycle Period [Period]

Exact occupancy repeat period of live state; zero if not detected.

Recorded Occupancy Tree [History]

DataTree[int] {generation} of live indices, only built when connected.

Recorded Age Tree [HistoryAges]

Matching age tree for recorded generations; only built when connected.

Retained Generation Numbers [Recorded]

Available historical generation numbers for ViewGen.

Simulation Report [Info]

Run state, units, bounds, generations, population, memory cap and notices.

Value List modes

Create a Value List, open its editor, paste one block below and connect it to the named input. The right-hand values are the actual numbers sent to the component. Ready-to-copy text files are included in examples.

Patterned Members / Pattern

Sine=0

Triangle=1

Harmonic=2

SmoothNoise=3

IndependentRandom=4

CosineLobes=5

Noise and random modes are intrinsically random; zero Randomness does not turn them into a regular sine.

Patterned Members / Section

Round=0

FramedRectangle=1

Round uses Dia; rectangle uses RectW, RectD and the enabled face-sheet controls.

Kinked Louvers / BendMode

AlternatingFloors=0

BlendWithinFloor=1

RandomBlendFloors=2

Use RandomBlendFloors for a smooth within-floor inward/outward transition whose direction also changes between floors. FadePower controls transition speed.

Value Lists / continued

Double U Glass / Mode

Full=0

Random=1

Clouds=2

Cellular=3

Gradient=4

Diagonal=5

Floors=6

Columns=7

Attractor=8

Full fills every cell and ignores Density. Attractor uses internal default attraction settings; this version has no free attractor-point input.

Double U Glass / Placement

Front=0

BetweenFloors=1

Manual=2

Front and BetweenFloors apply fixed project dimensions and automatic offsets. Manual uses Height and Offset.

Double U Glass / Quality

Lines=0

FastMesh=1

ExactBrep=2

Use Lines for layout, FastMesh for rendering and ExactBrep when exact surface/solid geometry is required.

Value Lists / continued

Double U Glass / Orientation

AlongBeam=0

AcrossBeam=1

Diagonal45=2

RandomMinus45to45=3

Angled options apply only in BetweenFloors. The random mode includes left/right signed angles, not only one rotation direction.

Sliding Facade / Infill

GlassBoxes=0

CopperLouvers=1

ShowModules=False skips moving infill. Fixed side/corner fins remain in CopperLouvers mode.

Copper Glass Pivots / Placement

BetweenBeams=0

OnBeamEdge=1

OutsideBeam=2

Offset and continuous carriers apply only outside the beam.

Copper Glass Pivots / SupportMode

ExposedRail=0

HiddenRail=1

IndividualBrackets=2

FoldedCover=3

ContinuousRHS=4

Individual brackets have no continuous rail or rear strip.

Value Lists / continued

Copper Glass Pivots / RotationMode

FixedAngle=0

Random=1

Alternate45=2

Count-safe static angle bands are reported by AngleRange.

Life Lab 3D / Pattern

CompactNoise=0

FullNoise=1

SolidCore=2

SeedPoints=3

Use a List of 3D seed points only with SeedPoints.

Quick recipes

Seven modules with 3 cm vertical gaps

Placement=BetweenFloors; Rows=7; GapZ=3; Floors=1; Quality=FastMesh

The actual Double U module height is calculated from the clear opening, row count, hardware allowance and requested gap.

Light sliding-frame setup

F=1; PanelW=500; Positions=[0.5]; ShowModules=False; Offset=-10

After positioning the frame, enable moving infill. For eight floors provide eight normalized positions from the bottom upward.

Both-side corner fins

F=1; Radius=110; FaceW=5; Depth=30; Gap=11; Offset=-10

Keep Frames, Copper and Chrome on separate material routes. Only the collective end boundary is filleted.

Alternating half-floor cables

CableDia=0.6; Spacing=11

This tool has eight fixed floors. Spacing is centre-to-centre, not clear surface-to-surface.

Random blended kinked louvers

F=3; H=400; TopGap=85; BendMode=2; FloorRandom=0.8; FadePower=2

Increase the K0/K1 difference for a steeper knee line within valid bounds. Offset moves the knee, while attachment references stay fixed.

Validation and limits

All 17 compiled components were executed in native Rhino/Grasshopper fixtures. Additional Life Lab state/timer tests and all 30 glass placement/support/curved-end combinations were checked. Reports are in validation.

This is not exhaustive testing of every parameter combination or a benchmark of all full eight-floor alternatives. Begin with one floor and use lightweight geometry settings.

Tests create temporary Grasshopper documents and do not bake geometry into the Rhino document. Document object counts are recorded before and after execution.

Input values use the project centimetre convention. Test scripts do not change document units. A valid numeric geometry fixture does not establish the physical scale of a production Rhino document.

Connection parts are concept/render geometry, not engineering calculations or fabrication certification. Building-solid collisions and full movement sweeps are not generally solved.

Release 0.2.0 preserves all 16 previous component IDs, appends the new glass sockets, upgrades glass to the v22 details, updates Guide Join and adds Life Lab 3D with its own new ID.

Python files are editable algorithm exports. GHX component sources include the published interface and optional defaults. Editing a standalone Python export does not automatically modify the installed GHA; update the component source and rebuild.

Generated C# wrapper sources and editable vector icons are included. No package has been uploaded to a public registry.

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