Tensela · All the nodes

138 nodes in 12 families. Each card: its name, what it gives, its inputs with their starting value, and what it is for.

Values 12 · Shapes 6 · Curves 20 · Surfaces 29
Divide 12 · Measure 19 · Transform 12 · Meshes 10
Fabrication 8 · Environment 6 · Simulation 3 · Groups 1

Values 12

Number — number
- value 0
- level value

A fixed number you can change by hand, or a list of values typed by hand (different floor heights, bay widths)

Formula — result
- formula a
- a
- b
- c
- d
- + 4 more

A calculation with a … h, as in a spreadsheet (angles in degrees)

Code — result
- code result = [point(i, 0, sin(i * 30)) f…
- a
- b
- c
- d
- + 4 more

Your own piece of Python, for what the nodes do not reach

Random — value
- mode per element
- data
- along
- count 10
- level element
- + 4 more

Random numbers

Series — series
- count 10
- mode with step
- start 0
- step 1
- to 1
- + 1 more

A series of numbers that creates a level

Point — point
- x 0
- y 0
- z 0

A point, or many if a coordinate has levels

Repeat — repeated
- data
- level
- length 5

Repeats a list, in order, up to a length

Function — value
- shape wave
- x
- y
- amplitude 1
- width 4

Ready-to-use functions

Yes or no — yes/no
- value yes

A switch

Info — value
- value

Shows on its card the value of what it receives (and passes it on unchanged)

Merge — merged
- a
- b
- c
- d
- e
- + 4 more

Two to eight data in one, with a new level

Merge lists — list
- a
- b
- c
- d
- e
- + 4 more

The elements of one list followed by those of another (up to eight), in a single list

Shapes 6

Random points — points
- region
- count 10
- seed 1
- level point

Random points inside a volume (a box, a prism) or a rectangle (in plan or in elevation)

Rectangle — rectangle
- width 4
- height 3
- origin 0 0 0
- plane plan

A rectangle with its lower-left corner at the origin

Box — box
- width 2
- depth 2
- height 2

A box centred on the origin

Bounding box — box
- geometry
- of all

The box that wraps a geometry, aligned with the axes

Prism — prism
- width 4
- depth 3
- height 3
- origin 0 0 0

A straight volume; its faces are asked for by name with "Faces"

Sphere — sphere
- centre 0 0 0
- radius 1

A sphere

Curves 20

Line — line
- from
- to

A straight line between two points (or many, if the points have levels)

Line by direction — line
- from 3
- direction 0 0 1
- length 1

A line from a point, in a direction and with a length

Arc — arc
- mode three points
- start 0 0 0
- direction 1 0 0
- middle 2 1 0
- end 4 0 0
- + 5 more

A circular arc

Catenary — catenary
- start 0 0 0
- end 4 0 0
- length 5
- length in metres
- gravity 0 0 -1

The exact shape of a chain or a cable hanging from two points

Circle — circle
- mode centre and radius
- centre 0 0 0
- curve
- at 0.5
- size fraction
- + 5 more

A circle with its centre, or tangent to a curve; with a second radius, an ellipse

Curve through points — curve
- points
- along
- smooth yes
- closed no

Joins the points of a level into a curve (removes that level)

Transition curve — curve
- a
- b
- bulge 0.5
- join yes

A smooth curve that joins the end of one curve to the start of another, without kinks

Drawn curve — curve
- points
- mode through points
- degree 3
- closed no

A curve drawn with the mouse

NURBS Curve — curve
- mode control points
- points
- stroke
- along
- degree 3
- + 2 more

A NURBS curve

Points on curve — points
- curve
- mode parts
- count 10
- distance 1
- positions 0.5
- + 1 more

Points on a curve

Tangent — vector
- curve
- what tangent
- mode fraction
- count 10
- distance 1
- + 2 more

The direction of a curve at some points (a vector of length 1)

Flip curve — curve
- curve
- direction

Each curve reversed

Cut curve — curves
- curve
- mode parts
- count 4
- distance 1
- positions 0.5
- + 2 more

Cuts each curve into pieces (into parts, every so often, at some positions or where some points fall), to work on them one by one

Rounded rectangle — outline
- width 10
- height 5
- radius 1
- origin 0 0 0

The outline of a rectangle with rounded corners (in plan)

Part of curve — segment
- curve
- from 0
- to 1

The part of a curve between two fractions of its length

Arrow — arrow
- from 0 0 0
- vector
- scale 1

A vector placed at a point, to see it

Join nearest — lines
- points
- count 3
- level neighbour

Joins each point to its nearest neighbours

Offset curve — curve
- curve
- distance 0.01
- corners round

Moves each curve aside in its own plane, keeping the same distance all along

Text — text
- at
- text {n}
- value
- decimals 2
- height 0.2
- + 4 more

Writes a label on each element

Contour — curves
- geometry
- distance 1
- direction 0 0 1
- start
- level cut

Cuts a surface or a volume with parallel planes at a set spacing

Surfaces 29

Cap — surface
- curve
- holes

The surface that closes a closed curve

Loft — surface
- curves
- along
- smooth yes
- closed no

A surface through the curves of a level, in order (removes that level)

Extrude — surface
- curve
- mode vector
- vector 0 0 1
- point
- caps no

Drags each curve along a vector

Surface from points — surface
- points
- mode grid
- smooth no

A surface through some points

NURBS Surface — surface
- points
- level u
- level v
- degree u 3
- degree v 3
- + 3 more

A NURBS surface

Revolve — surface
- profile
- origin 0 0 0
- axis 0 0 1
- degrees 360

The surface a profile leaves when turning around an axis

Sweep — surface
- profile
- path
- path 2
- place where it is
- rotation 0

The surface a profile leaves when running along a path without twisting

Surface points — points
- surface
- what points
- mode lattice
- count u 5
- count v 5
- + 2 more

Points on a surface (in a grid or at some fractions of u and v), or its normal there

Surface morph — geometry
- geometry
- surface
- count u 6
- count v 6
- height 1

Covers a surface with a module (paneling)

Surface curvature — curvature
- surface
- what Gaussian
- mode lattice
- count u 5
- count v 5
- + 2 more

The curvature of a surface at some points, as numbers to use

Unroll — plane
- geometry
- what unrolled
- place in a row
- spacing 1

Flattens surfaces onto the plane to cut them from a sheet (metal, board, fabric)

Flip surface — surface
- surface
- what face

The surface flipped

Closest point on surface — point
- points
- surface
- gives point

The point of a surface closest to each point

Curve on surface — curve
- surface
- points
- along
- smooth yes
- closed no

A curve that lies on a surface, through some points given by their u and v

Geodesic — curve
- surface
- from 0
- to 1
- show curves

The shortest path between two points over a surface, like a string pulled tight on it

Sub surface — surface
- surface
- u from 0
- u to 1
- v from 0
- v to 1

The piece of a surface between two fractions of u and two of v

Intersection — crossing
- a
- b

Where two geometries cross

Split surface — pieces
- surface
- curves
- direction 0 0 1
- what all pieces

A surface split into pieces by curves that cross it or pierce it (projected onto it)

Isocurves — curves
- surface
- direction u
- mode parts
- count 10
- positions 0.5
- + 1 more

The surface's own lines, in u or v

Network surface — surface
- curves u
- curves v

The surface through a network of curves in two crossing directions

Edge surface — surface
- a
- b
- c
- d

The surface stretched between two, three or four edges that meet at the corners (in any order and direction)

Hypar — hypar
- panels 8
- lift 0.1
- corners first and third
- show folded piece

Folds each panel into a hypar (a hyperbolic paraboloid)

Diagrid — diagrid
- surface
- divisions u 8
- divisions v 6
- what diagonals
- members straight
- + 2 more

A grid of diagonal members on a surface, in diamonds

Space frame — space frame
- surface
- divisions u 8
- divisions v 6
- truss depth 1
- what all members

A two-layer structure of members on a surface

Chebyshev net — net
- surface
- u 0.5
- v 0.5
- surface 1
- count 10
- + 3 more

A net of quadrilaterals with four equal sides on a surface

Pipes — mesh
- curves
- radius 1
- fillet
- detail 4

A pipe around each line, all fused into a single skin with smooth fillets at the nodes

Pipe — surface
- curves
- section round
- radius 0.5
- sides 16
- width 0.3
- + 4 more

A member along each curve, each on its own (not fused)

Ribs — ribs
- shape
- count 30
- weight 0.02
- cuts x
- back 0

Cuts a shape into parallel boards, closed against the wall

Boolean — body
- a
- b
- operation difference

Unites, subtracts or intersects closed bodies

Divide 12

Grid — cells
- rectangle
- columns
- rows
- cell width
- cell height
- + 4 more

Divides a rectangle (by number, cell size or uneven cuts) or a curved surface into rows and columns; on a surface, with flat or curved panels

Divide — parts
- rectangle
- parts
- size
- level part
- direction width

Divides a rectangle into parts in one direction; the new level gets the name you choose

Voronoi 3D — cells
- points
- region
- level cell
- faces level face

Divides a volume into cells

Voronoi — cells
- points
- boundary
- radius
- level cell

Divides a plane into cells

Centre — centres
- geometry

The centre of each element

Faces — faces
- volume
- which façades
- level face

The faces of a prism or a box, by name (south, roof…), as rectangles

Pick — picked
- data
- level
- position

Takes elements of a level by their number (from 0)

Split — groups
- data
- level
- mode groups of
- count 2
- new level group

Splits the elements of a level into groups

Join levels — joined
- data
- first
- second
- new level

Joins two levels into one, in order

Reorder — reordered
- data
- level
- mode invert
- count 1
- wrap yes
- + 1 more

Changes the order of a level

Vertices — points
- geometry
- level vertex

The vertices of each element, as points

Edges — lines
- geometry
- level edge

The edges of each element, as lines

Measure 19

Distance — distance
- a
- b

Distance between points, in metres

Graph — value
- value
- points 0 0 1 1
- to min 0
- to max 1
- smooth yes
- + 2 more

Passes each value through a curve you draw by hand

Image sampler — value
- file
- where
- frame
- plane
- channel brightness
- + 2 more

A value at each point, read from an image laid over a rectangle

Attractor — value
- where
- attractors
- more vertical
- reach 0 0 0
- near 1
- + 3 more

A value per element according to how close it is to some points or curves

Closest point — point
- points
- curve
- gives point

The point on the curve closest to each point

Remap — value
- value
- from min
- from max
- to min
- to max
- + 2 more

Maps a value from one range to another (near = 90°, far = 0°)

Summarise — summary
- data
- operation sum
- along

The maximum, minimum, sum, average or count of the values; removes the given level, or all

Compare — yes/no
- a
- b
- operation less

Yes or no for each element

Combine conditions — yes/no
- a
- b
- operation and

Combines two conditions

Choose — chosen
- condition
- yes
- no

For each element

Inside — yes/no
- points
- region

Yes or no for each point

Filter — filtered
- data
- mode condition
- condition
- level
- pattern yes; no
- + 4 more

Keeps some elements

Normal — vector
- rectangle

Where each rectangle faces (outwards, on the faces of a prism)

Measure vector — size
- mode length
- base
- other 0 0 1

The length of a vector, or the angle (in degrees) between two

Length — length
- curve

The length of each curve, in metres

Area — area
- geometry

The area of each element, in m²

Volume — volume
- geometry

The volume of each closed body, in m³

Centroid — centroid
- geometry

The centre of gravity of each element

Coordinate — value
- point
- axis z

The x, y or z of each point

Transform 12

Vector — vector
- mode x, y, z
- x 0
- y 0
- z 1
- axis z
- + 6 more

A direction with its length

Move — geometry
- geometry
- mode vector
- vector 0 0 1
- distance
- from
- + 1 more

Moves each element

Rotate — geometry
- geometry
- degrees
- axis vertical
- centre 0 0 0
- direction

Rotates each element about an axis

Orient — geometry
- geometry
- from 0 0 0
- to 0 0 0
- to direction
- to normal 0 0 1

Takes the geometry to other places, turning it to their direction and their normal

Morph — geometry
- geometry
- into
- height 1

Fits a module into each cell, bending with it

Scale — geometry
- geometry
- factor 1
- centre

Enlarges or shrinks each element

Project — geometry
- geometry
- amplitude 0

Brings the geometry to a height, flat

Scale by axis — geometry
- geometry
- x 1
- y 1
- z 1
- centre

Scales differently in x, y and z

Twist — geometry
- geometry
- degrees 90
- centre 0 0 0
- from 0

Twists the geometry around a vertical axis

Place — geometry
- geometry
- at
- rotation 0
- axis vertical

Rotates the geometry about its origin and takes it to each point

Thicken — block
- rectangle
- thickness

Gives thickness to each rectangle (a block) or to a surface

Frame — frame
- panel
- opening 0.5
- thickness 0
- width
- output frame

A frame with an opening in each panel (by proportion or by frame width), or the opening alone

Meshes 10

Mesh — mesh
- points
- faces

A mesh from its vertices and its faces

Flip faces — mesh
- mesh
- which

Turns faces over

Mesh faces — faces
- mesh
- what normals

Reads each face of a mesh

Mesh surface — mesh
- surface
- count u 10
- count v 10

A surface as one mesh of quadrilaterals that share their vertices (on a surface that goes round, the seam is closed too)

Triangulate — mesh
- mesh
- diagonal shorter

Every face as triangles

Join meshes — mesh
- a
- b
- c
- d
- e
- + 5 more

Everything with faces, with all its elements, as one mesh

Mesh edges — edges
- mesh
- which naked

The edges of a mesh as lines

Smooth mesh — mesh
- mesh
- method Catmull-Clark
- levels 2
- border smooth

A smooth mesh from a simple one

Edit mesh — mesh
- mesh
- moves

Shape a mesh by hand

Delaunay — mesh
- points
- more

Joins points in triangles as even as possible (no point inside the circle through the corners of a triangle)

Fabrication 8

Sections — sections
- shape
- thickness 0.003
- gap 0
- cuts x
- count 8
- + 4 more

Cuts a shape into boards of a sheet's thickness, each one a closed outline ready to cut

Slots — slotted
- first
- second
- thickness 0.003
- clearance 0.0002
- slotted first from above
- + 1 more

Where two families of boards cross (a waffle, an egg-crate), a slot halfway in each

Lay flat — sheets
- pieces
- width 0.6
- height 0.4
- spacing 0.004
- margin 0.01
- + 5 more

Lays flat pieces on sheets, ready to cut

Bevel — boards
- pieces
- thickness 0.003
- size 0.001
- profile rounded
- segments 4
- + 2 more

Boards with their edges eased, to see them, print them or mill them with a bevel bit (a laser always cuts straight)

Numbers and sheets — marks
- laid
- show numbers
- lettering plain
- weight single
- reading along the sheet
- + 1 more

The numbers of the pieces laid by a Lay flat (to engrave, blue) or the outlines of its sheets

Print check — problems
- geometry
- show problems
- width 0.2
- depth 0.2
- height 0.2
- + 1 more

Says whether a piece can be 3D printed, and if not, why and where

Planarize — panels
- panels
- show panels

Makes the panels of a curved surface flat, so they can be cut from boards or glass, while they keep meeting corner to corner

Plates — plates
- shape
- thickness 0.012
- gap 0.01
- show plates

Turns each face of a shape into a plate of some thickness, trimmed back from each edge just enough for the plates that meet there to keep the same gap, whatever their angle (an acute edge, more; a flat one, little)

Environment 6

Sun — sun
- location Madrid
- latitude 40.42
- longitude -3.7
- time zone 1
- day 21
- + 4 more

Where the sun is for a place, a day and an hour, and its path

Shadow — shadow
- geometry
- ray
- ground 0
- surfaces
- show shadow

The shadow of some geometry with the ray of a Sun

Incidence — incidence
- faces
- ray
- side its face
- show sunlight

How straight the sun reaches each face (the cosine law)

Insolation — insolation
- faces
- obstructions
- climate
- location Madrid
- latitude 40.42
- + 6 more

The solar energy each face receives in a period (a year, a season, a month, a day), with what shades it

Climate — climate
- file
- show temperature
- per hour

The climate of a place from a weather file (.epw)

Daylight — daylight
- points
- room
- glass
- obstructions
- transmittance 70
- + 4 more

How much natural light reaches some points inside a room, under an overcast sky

Simulation 3

Equilibrium — equilibrium
- shape
- spans 10
- supports ends or corners
- more supports
- self weight 100
- + 12 more

The shape a cable, a membrane or a shell takes at rest, hanging from its supports or lying on a floor, under its weight and its loads

Bar analysis — bars
- shape
- spans 0
- diagonals no diagonals
- supports
- support clamped
- + 8 more

How much a structure of bars bends, and how hard each bar works

Topology optimization — shape
- region
- voids
- solid parts
- supports
- rollers
- + 8 more

Where the material should be, inside a region, to carry some loads to some supports with the least of it

Groups 1

Group result — value
- group
- gives

Another result of a group that gives several

CC BY-SA 4.0