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Modeling

[Opensubdiv Modelling Notes](#)

v0.4

Different mesh configurations within the same boundary

Boundary's Vertex Number	4	5	6	8	10	12	n (Extrapolation)
Central Division							Subpatch Sharp Edges Calculation Each Subpatch Edge needs more than two hold edges to be sharp. So its a total of three edges per edge. $n = 3 \times \text{Enclosed Polygon Vertices No.}$
Parallel Division							Result in a Triangle $n = 2Z + 1$ Result in Odd Quads $n = 4Z$ Result in Even Quads $n = 4Z + 2$
Grid Division							Result in a Triangle $n = 2Z + 1$ Result in Even Quads $n = 2Z$
■ Quads ■ Squares ■ Triangles ■ Standing on Element ■ No. Vertices ■ No. Polygons	Central Two Quads sharing two edges. Two FourpointTris.	Odd Boundary's Vertex numbers result in a triangle.	Central The 3 Edge Pole.	Central Mirrored Flow. Lowest number for round meshes.	Central The 5 Edge Pole.	Central Enclosed Square with mirrored flow.	$n = \text{Boundary's Vertex Number}$ $2Z = \text{Multiple of } 2$ $4Z = \text{Multiple of } 4$ $e = \text{Edge Number}$

Linear Stepping

A small example of flows resulting of adding different Edge Loops to simple Stepping Elements.

Boundary's Vertex Number	4	5	6	8	10	12	e (Extrapolation)
Odd Step Amounts			Odd Step Amounts result in a triangle inside the margins. This is something to take in account in the whole process of stepping, since a bad connection or division may lead to this.				Solutions: Find a triangle in a margin to merge with or, add an Edge Loop to one of the margins.
FourPointTriangle <i>Adding Link Loops only for Constant Step Amount of 2</i>		Best method for straight flat steps. All other methods create vertices between margins.					No vertices causing pinching between margins. Tough, there will be pinching on the margin. If it troubles, add an Edge Loop between the margin and the stepping to hold the mesh.
Trapezium (works in pairs) <i>Adding Link Loops only for Constant Step Amount of 2</i>		Stable flow, with vertices between margins to shape the mesh.					The placing of Link Edge Loops, in or out of the pair of Trapeziums, control the amount of vertices between margin.
Stepping Structure							
Stepping Elements 							
More Edges Margin (M) $M - L = \text{Step Amount}$ Less Edges Margin (L) $M = \text{Step Factor}$							
Edge Loop Types 							
Basic Flow. Plus Edge Loops to control Stepping's Amount and Factor.							
Random Example of Combining Steps							
Many times it's easier and better to divide the stepping operation in small ones. So there is more control of each area's shape and the math gets easier. Divisions might create two Odd Step Amounts from one Even Step Amount, so they have to be well placed.							

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Moving Polesv0.2

Examples of modeling procedures to change Poles' location

	Movement Position	Add Two Edges++	Remove Two Edges--	Add and Remove Edges (mixture)+-	Add and Remove Edges (alternative)+-
Linked					
3 Pole					
Opposed					
Linked					
5 Pole					
Opposed					

	Up	Down	Sides (Spin Edge)	Diagonals Up	Diagonals Down
Linked					
3-5 Pair					
Opposed					

Vertices and Polygons Valence

23456>6

Added

Removed

Mirrored Procedure's Axis and Markers

edge bevel

face loop collapse

What to expect from (Linked) vertices Merge and Split operations

$4 + 4 = 4$

$3 + 3 = 2$

$5 + 5 = 6$

$5 + 3 = 4$

$A + B - 4 = C$
(In All-Quads
4 is baseline)

For single Poles the procedure requires global changes in topology by adding and/or removing edge loops.
To diminish that effect one can try to operate across symmetry lines or dump the changes to occluded areas, holes or N-Gons.

For pairs of 3-5 Poles the procedure is quite easy and changes are only local.

Some procedures can be also applied across the Mirror Axis, which is always vertical here for easy display purposes.

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