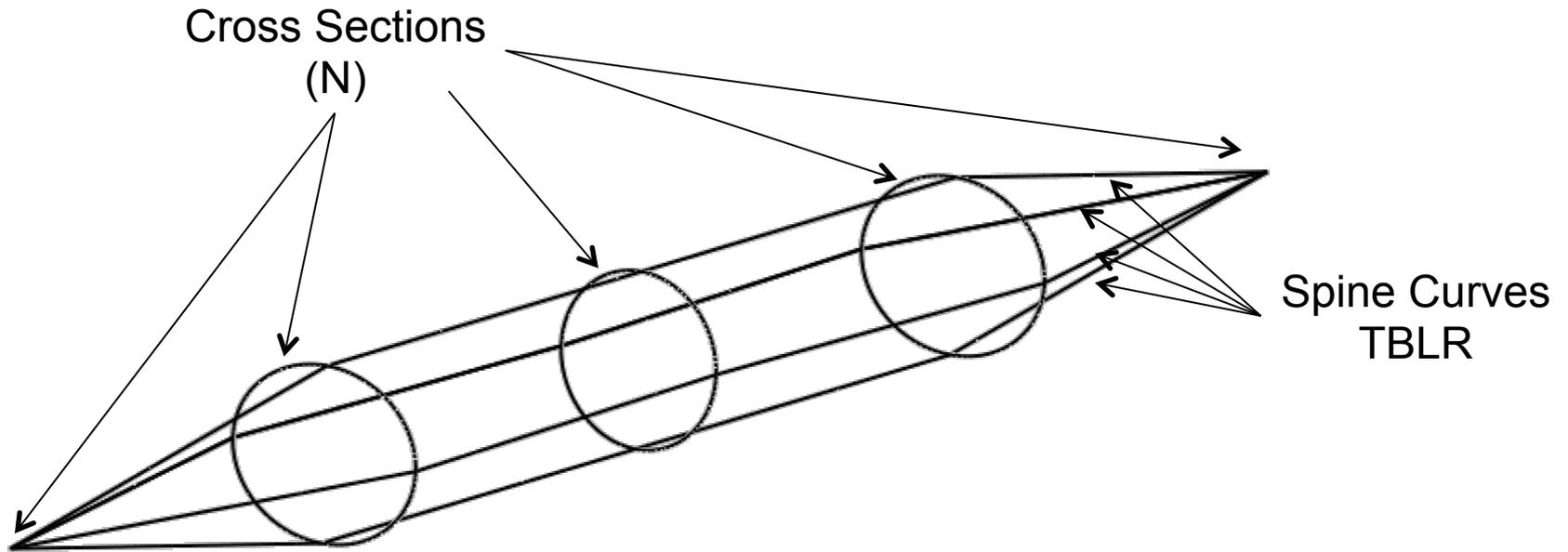


OpenVSP Skinning Explained

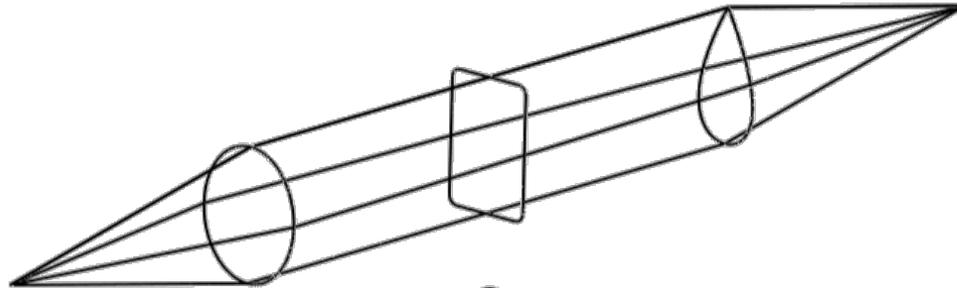
Rob McDonald

Defining Curves

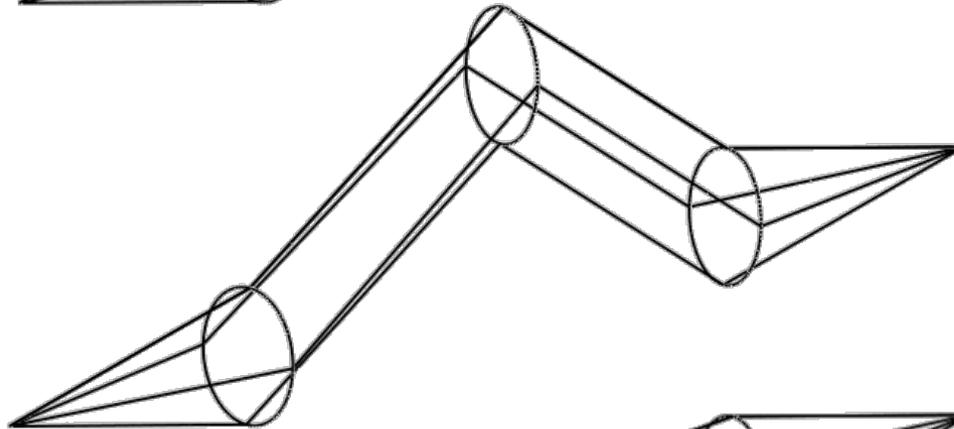


Cross Section

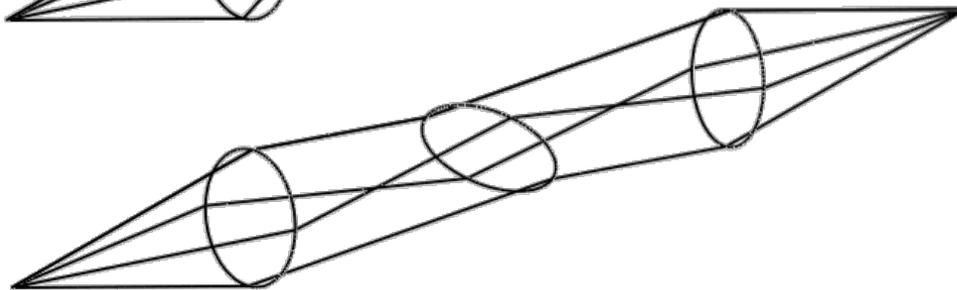
Type



Position

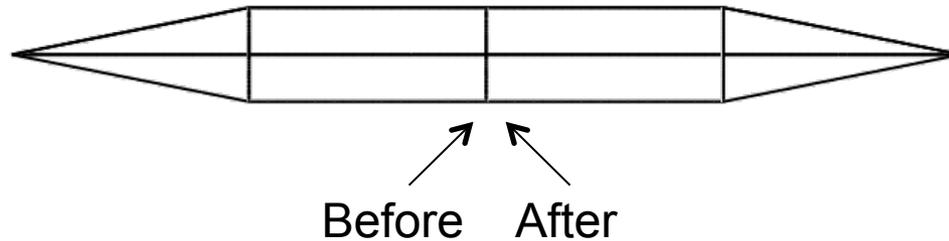


Rotation



Cross Section Sides

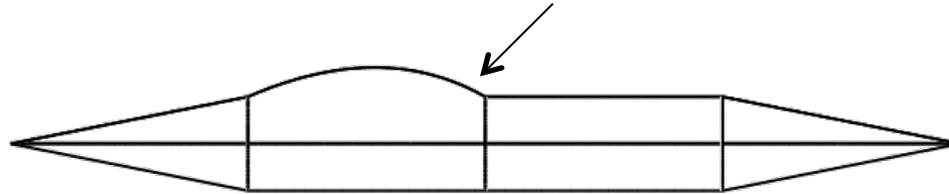
Each XSec has two sides
where you can control each spine's
angle, strength, & curvature.



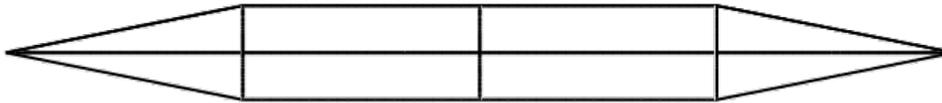
Angle

Direction of Derivative
Vector 'Out of Plane'

Angle = -30°



0°



30°



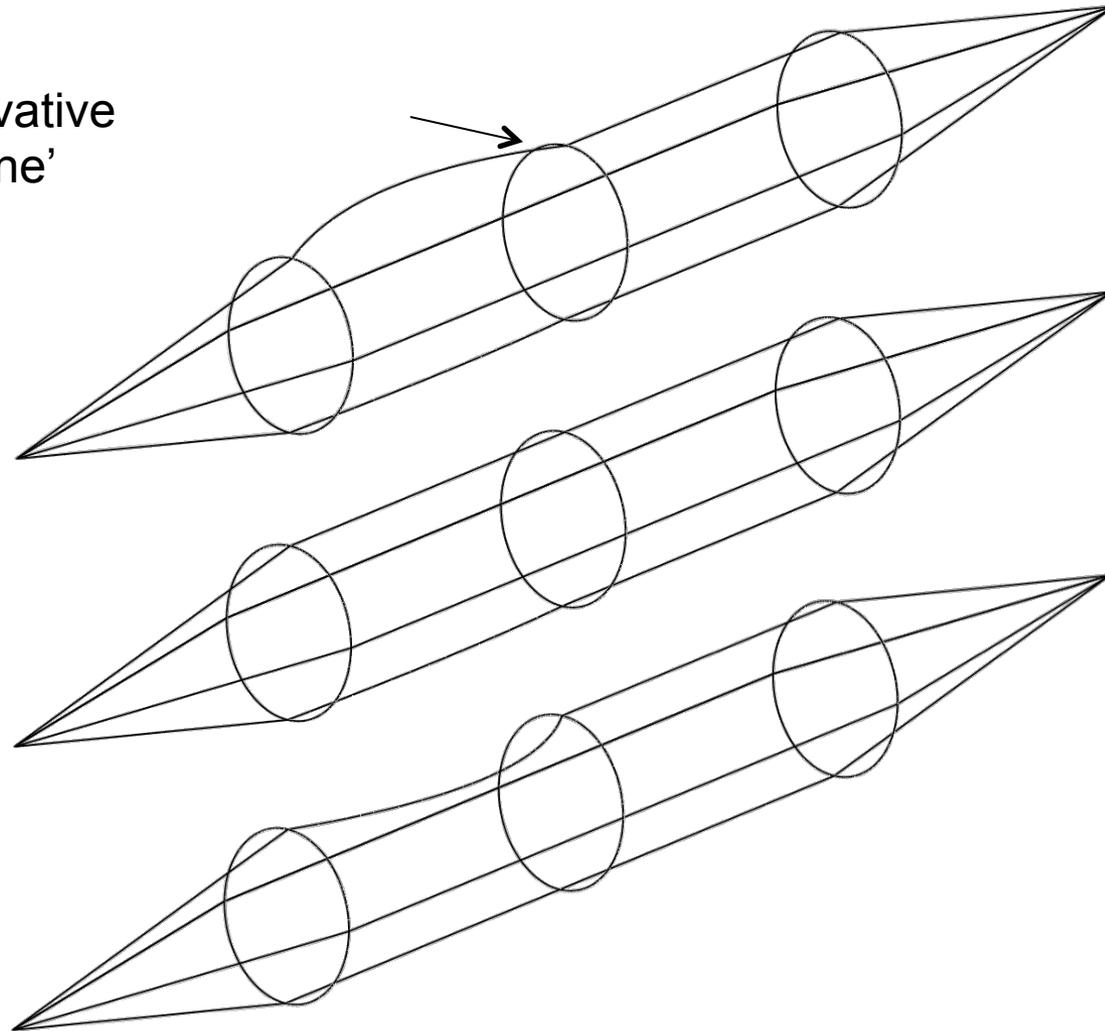
Slew

Direction of Derivative
Vector 'In Plane'

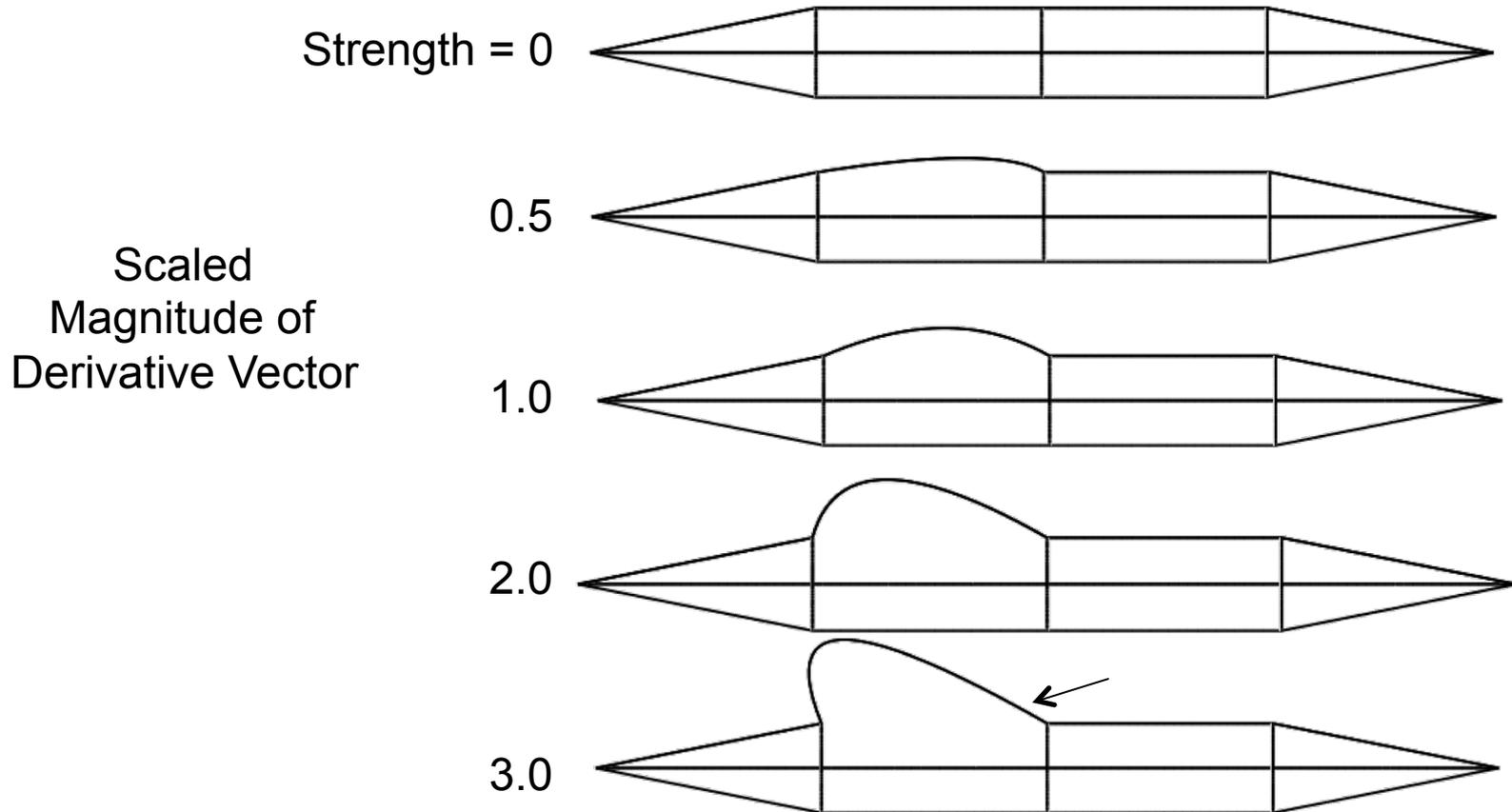
Slew = -30°

0°

30°

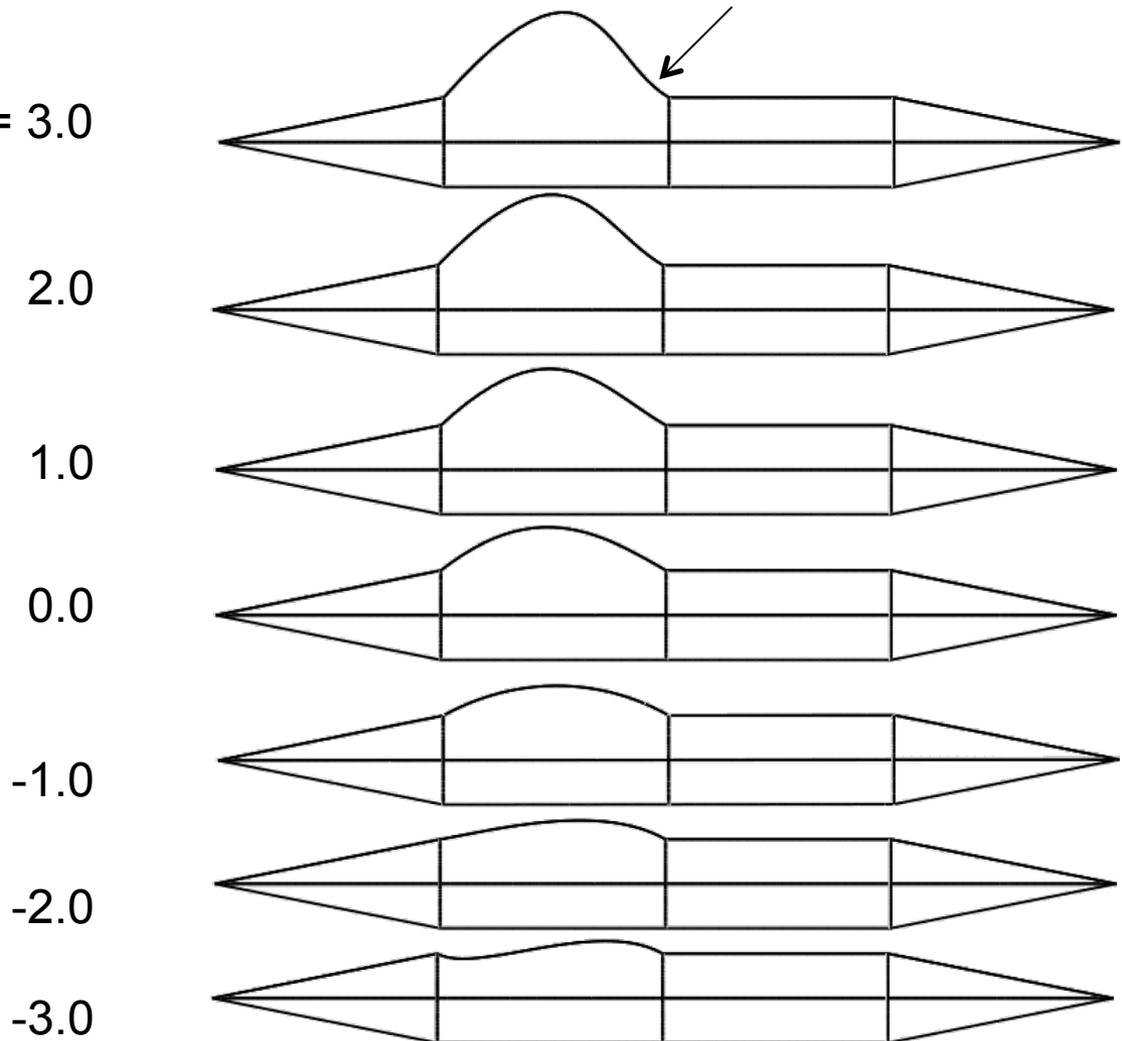


Strength



Curvature

Magnitude of
curvature vector = 3.0

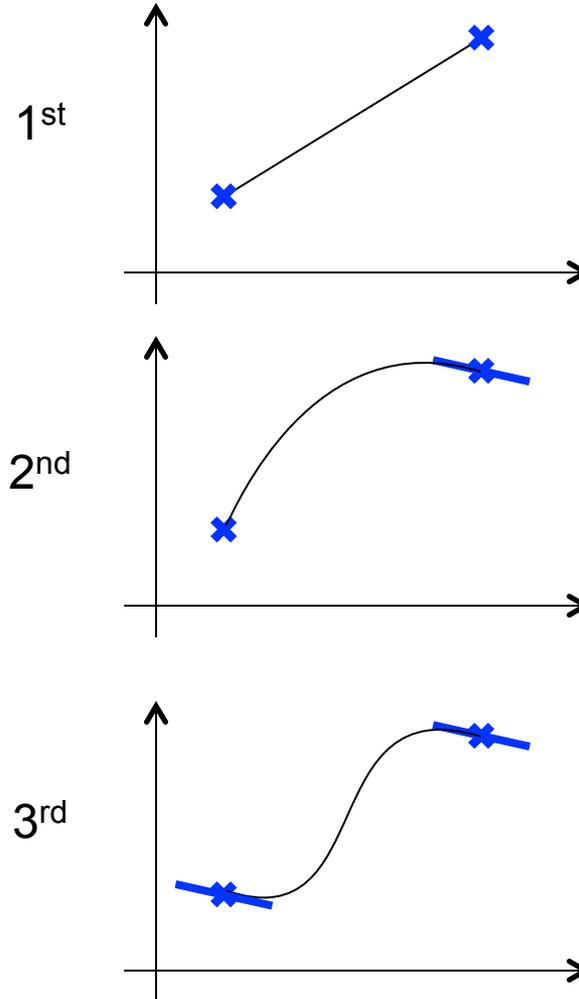


Order

Spine promotes order
to match what you specify

2 Points
2 Slopes
2 Curvature

Up to 5th order !



Continuity

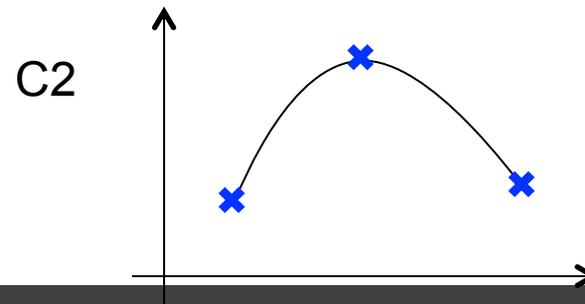
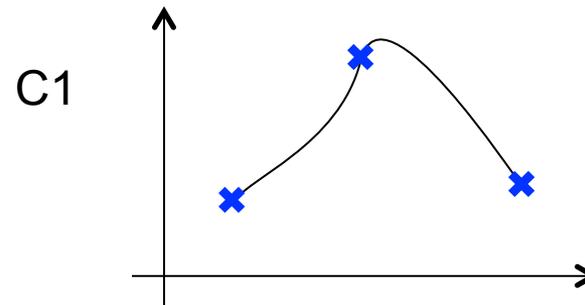
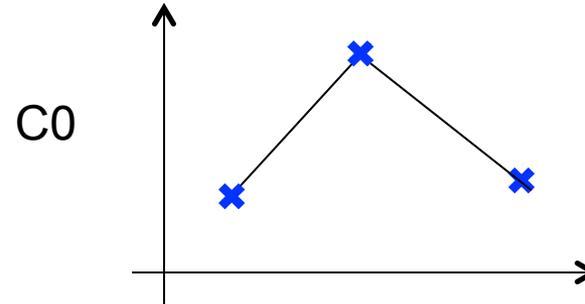
Continuity can be enforced across an XSec.

Continuity can also be an unenforced choice.

C0 – Line continuous

C1 – Derivative direction & magnitude

C2 - Curvature



Interesting Behavior

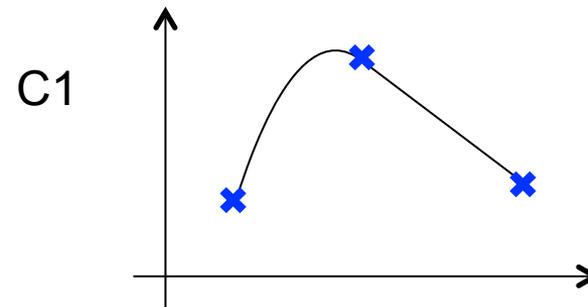
What happens when C1 is enforced, but no slopes are specified?

One curve 2nd order
One curve 1st order

Which is which?

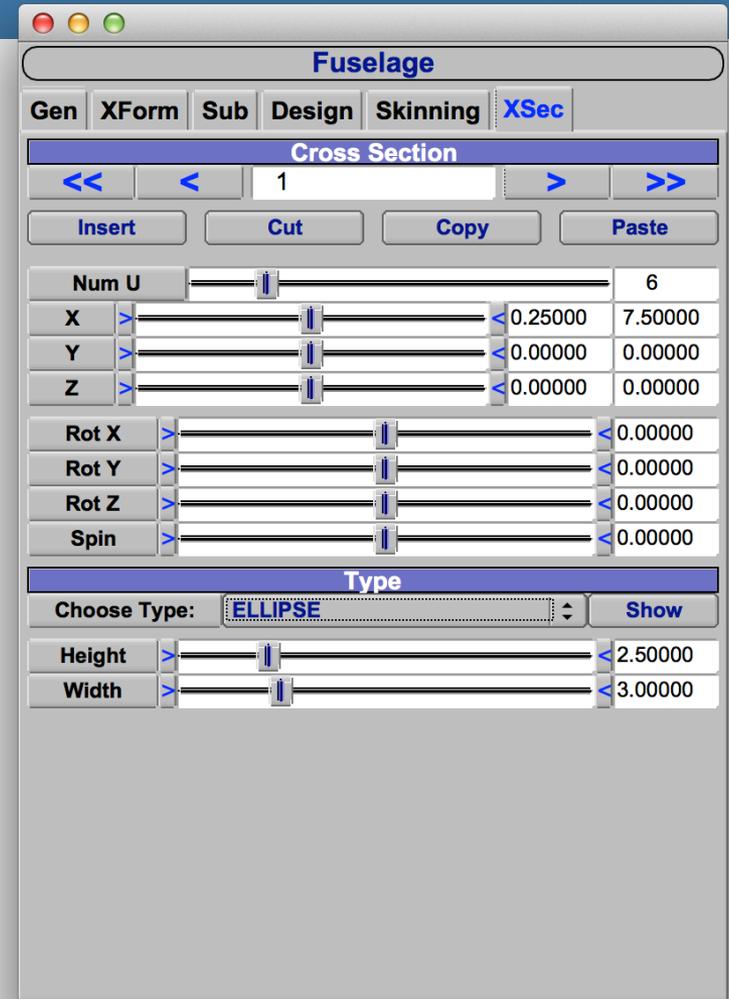
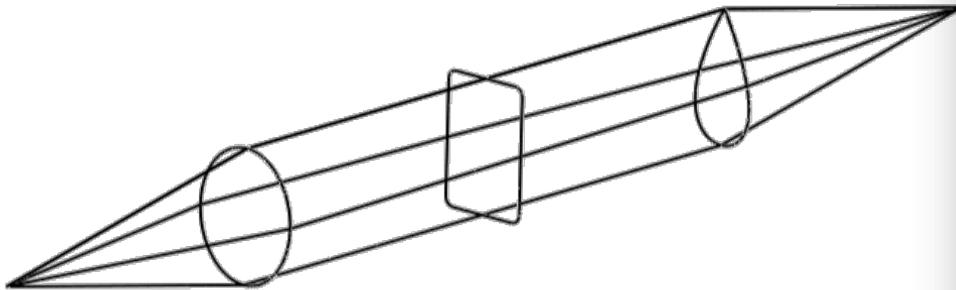
'Someday' we will add ability to limit order of a segment.

Math ready,
GUI uncertain.



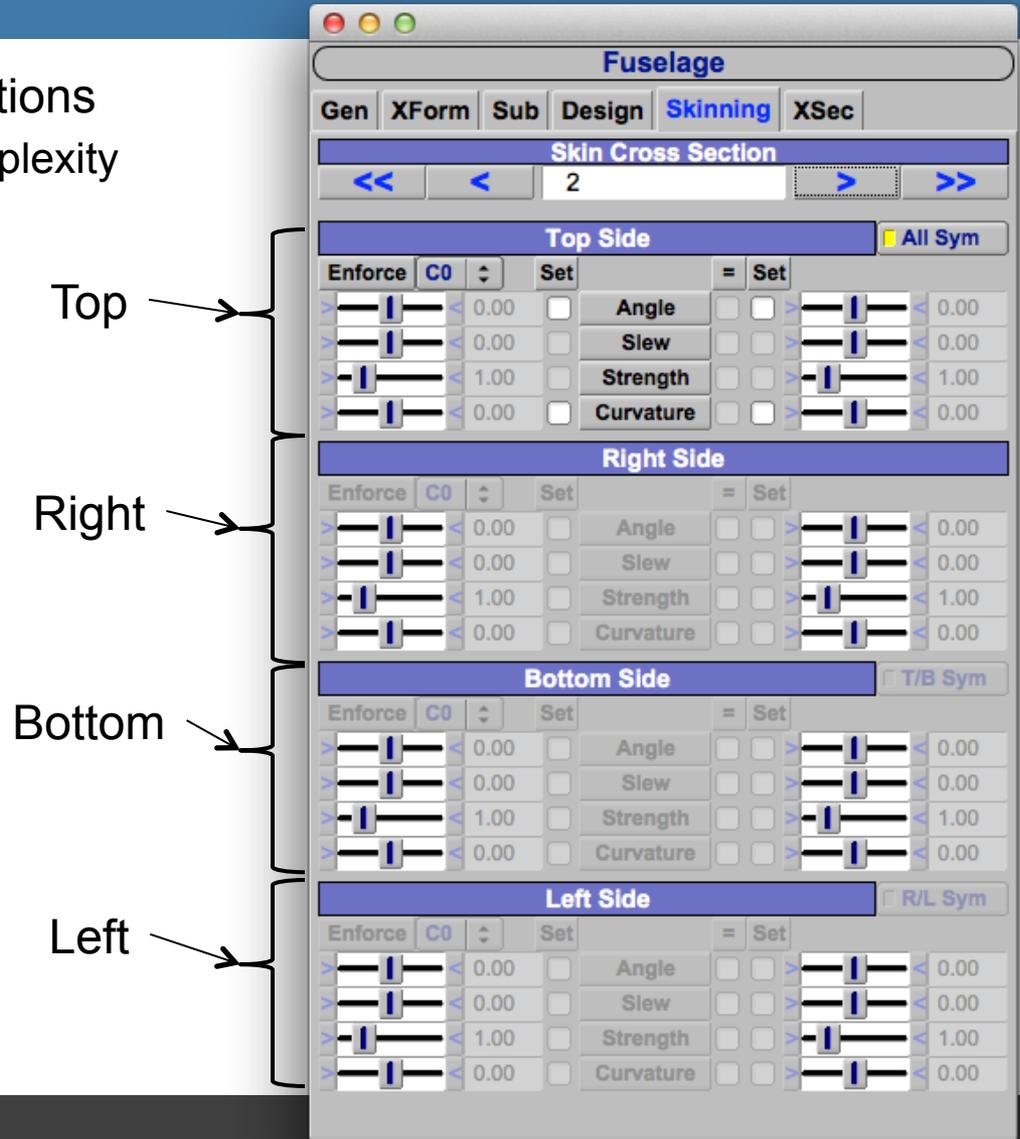
Cross Section Definition

- Skinning defined at cross sections
 - Cross section type (circle, ellipse, etc.)
 - Cross section size (height, width)
 - Cross section shape (various parameters)
 - Cross section position (x, y, z)
 - Cross section orientation (Rotate x, y, z)
 - Spin currently disabled



TBLR Spine Control

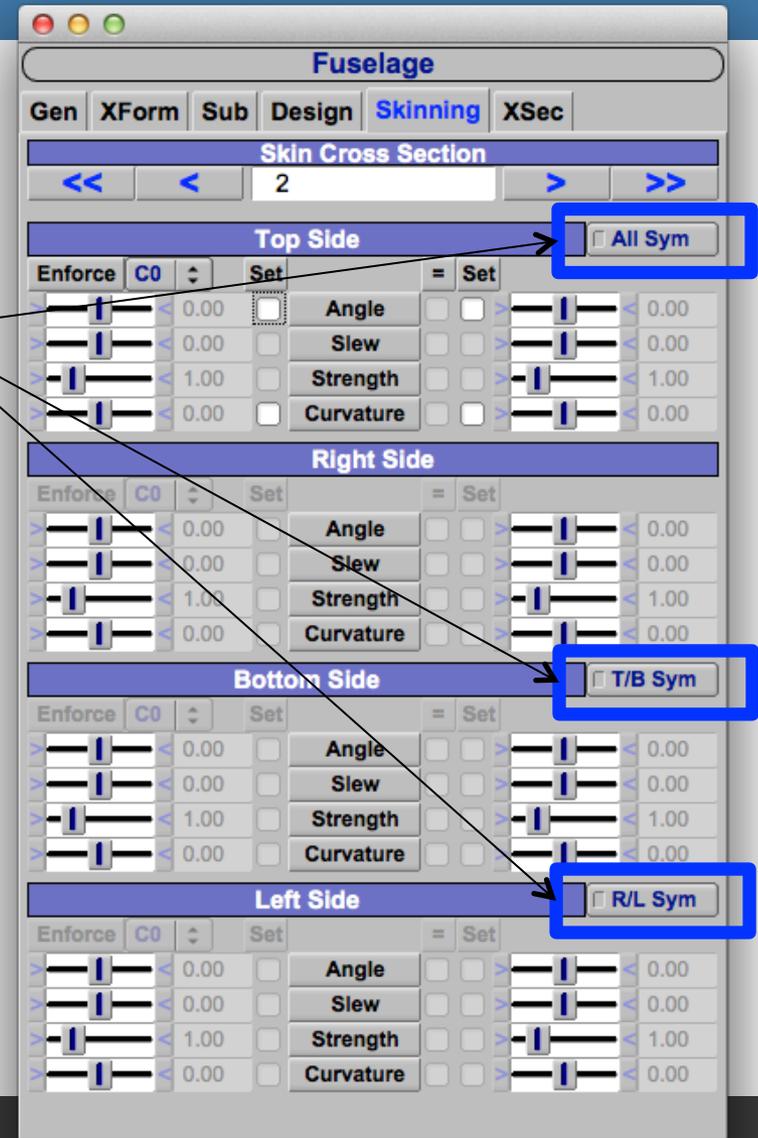
- Skinning defined at cross sections
 - Many options of varying complexity
 - Four spine curves (TBLR)



Symmetrical Spine Specification

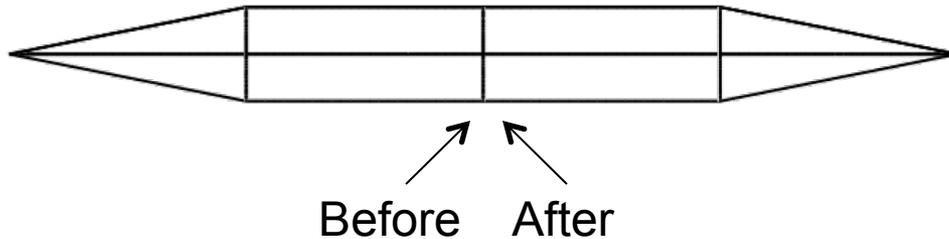
- Skinning defined at cross sections
 - Many options of varying complexity
 - Symmetrical specification
 - All Sym (T=B=L=R)
 - T/B Sym (T=B)
 - R/L Sym (R=L)
 - Does not mean symmetrical result !!!
 - Symmetrical XSec?
 - Position / Rotation of XSec?
 - Neighboring XSec & Skinning?

Symm
Controls

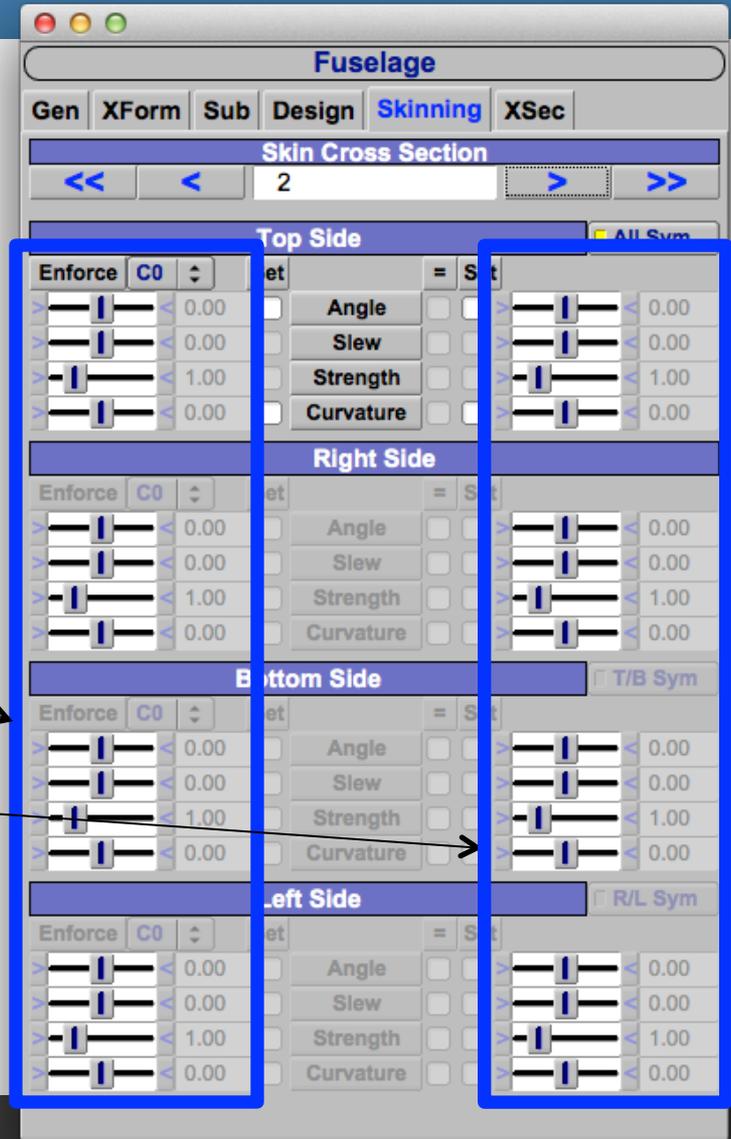


Before/After Control

- Skinning defined at cross sections
 - Many options of varying complexity
 - Each XSec has two sides

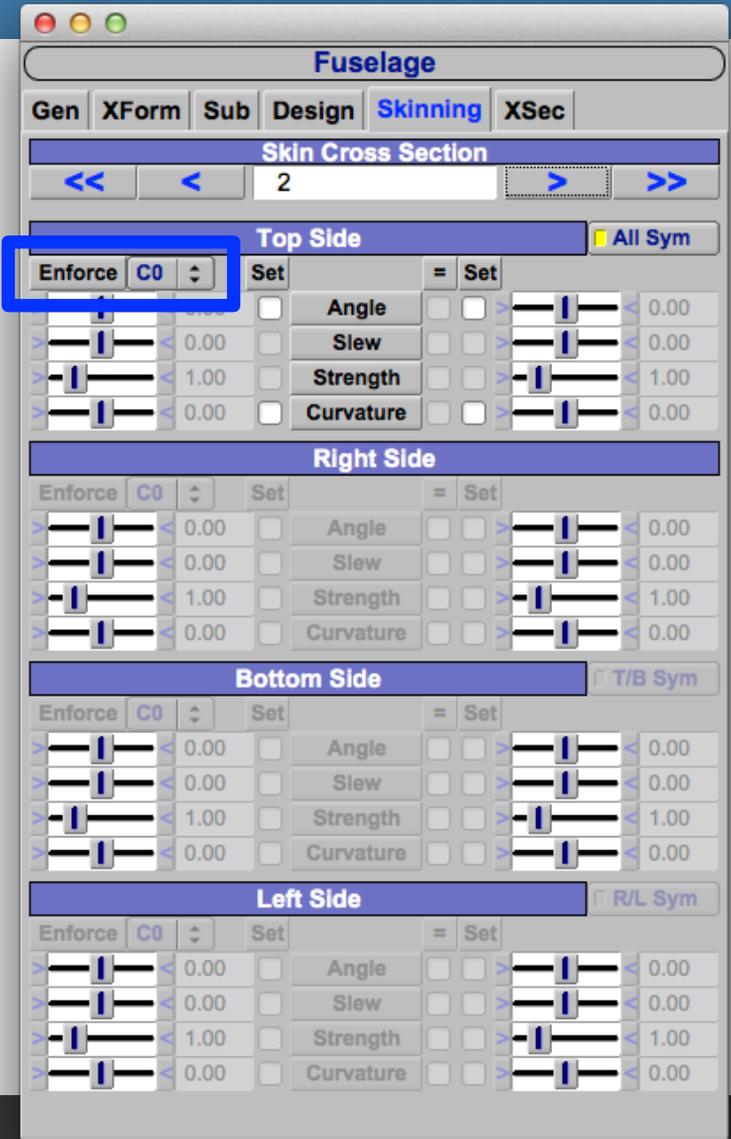
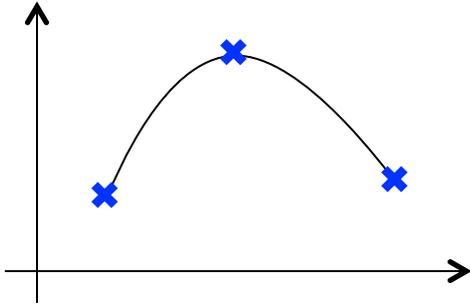


Before →
After →



Continuity Control

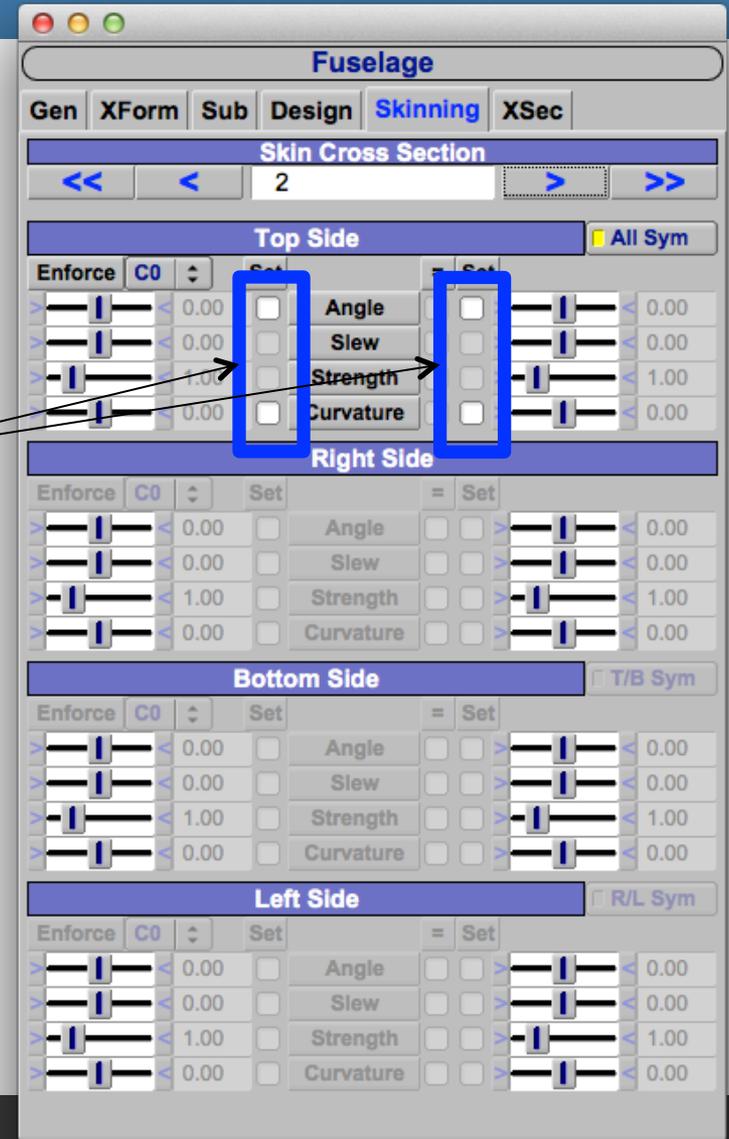
- Enforce Continuity
 - Good to enforce a smooth surface when you don't want to specify angles & strength.
 - Can be confusing if used with angles & strength.



Choice in Control

- Choose to set parameters
 - Will find 'natural' value if not set
 - Angle, Slew, Strength set together
 - Set one, you set them all.

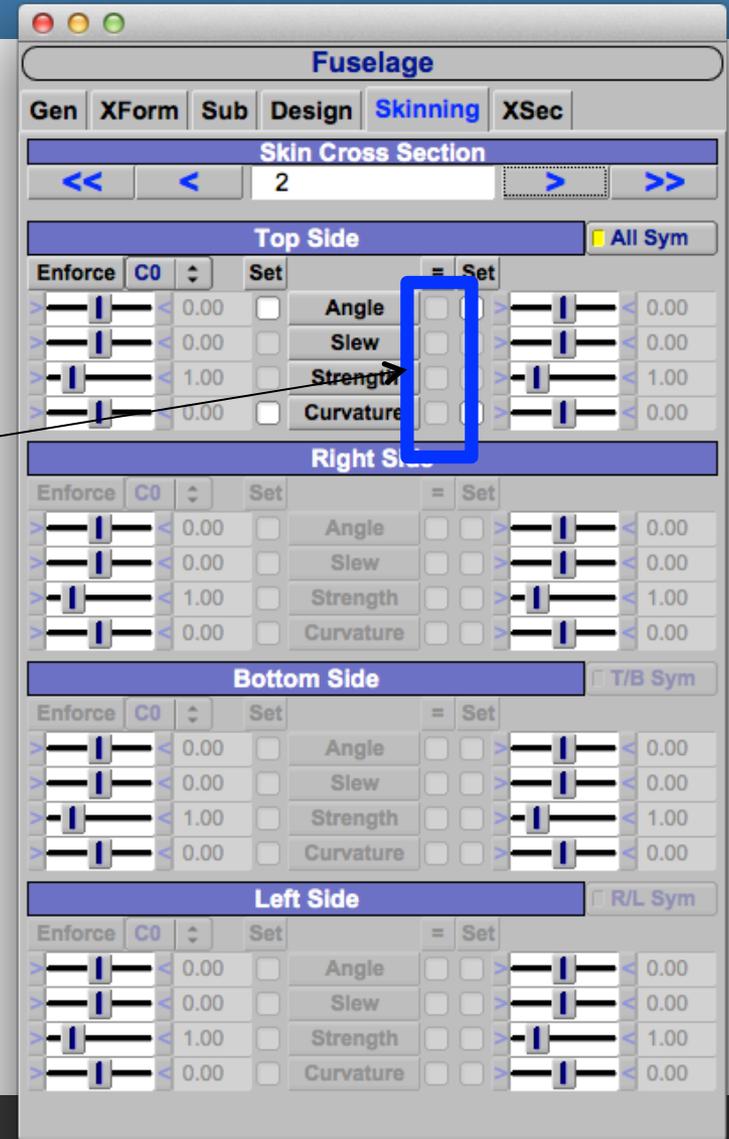
Choose to Set



Choose to Set Equal

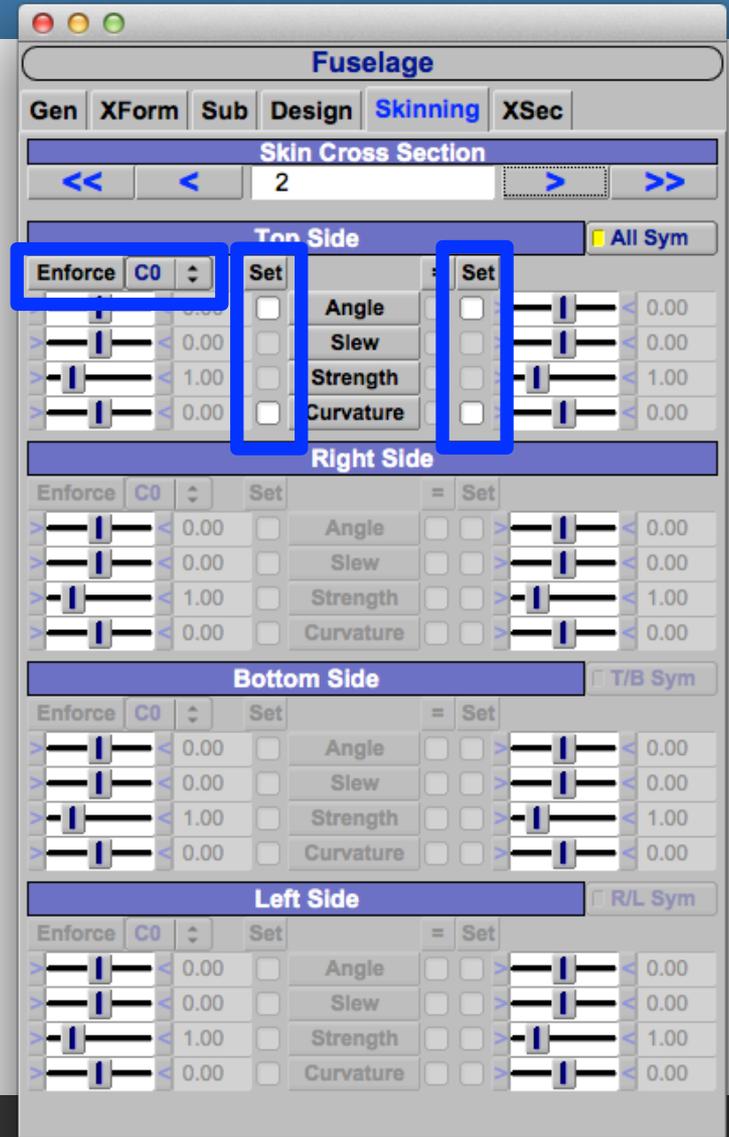
- Choose to set parameters equal
 - Similar to continuity, but just a helper.

Choose to set =



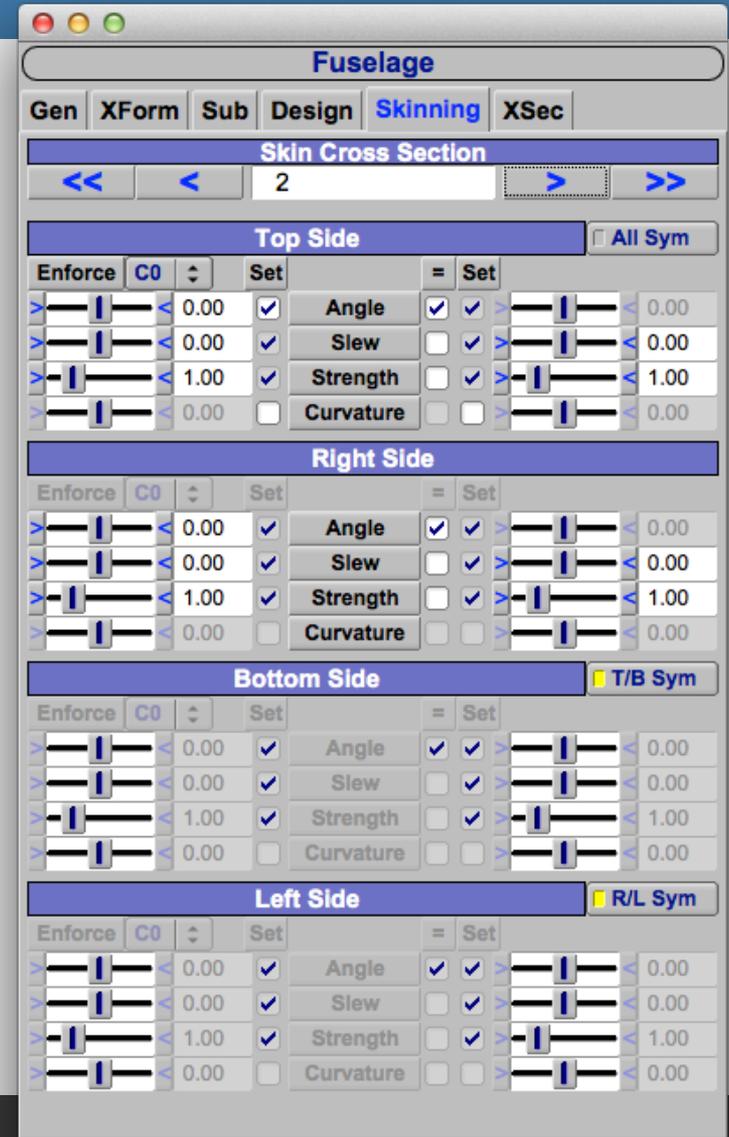
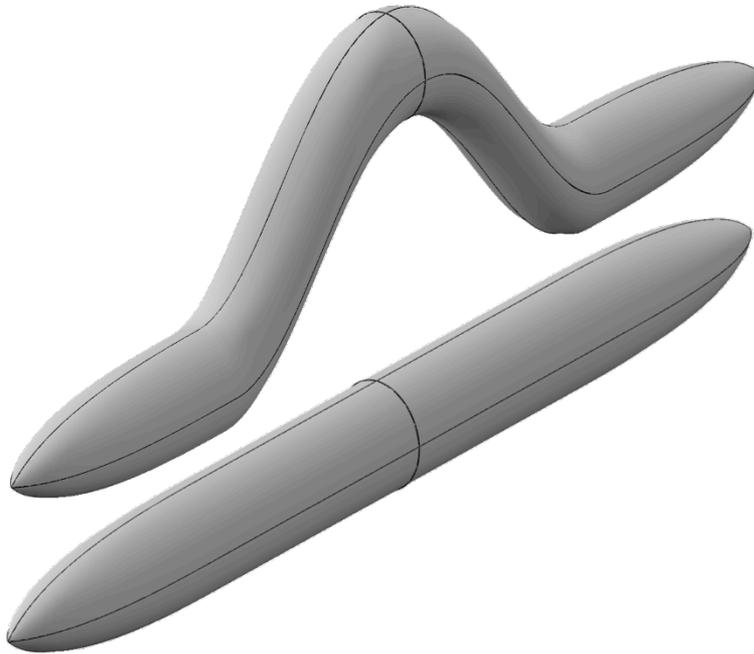
Limitations

- Choices currently apply to entire XSec
 - If you choose to enforce continuity...
...you **MUST** enforce it TBLR.
 - If you choose to set a value...
...you **MUST** set it TBLR.
 - If you choose to set angle, slew, strength...
...you **MUST** set all three.
- Plan to relax this requirement
 - Someday (3.?)
 - GUI Ready for change.
 - Parameters ready for change.
 - File format ready for change.



Default Settings

- Matches v2's FUSE2
 - Angles equal at section
 - Independent before/after strengths
 - v3 strength \approx 3 times v2 strength.
 - T/B and R/L Symmetry selected
 - No set curvature or continuity enforcement



Practice Session

- Skinning Fuselage
 - Start simple
 - Less is more
 - Add controls one at a time
 - Play with values