

A GOLDEN RATIO FOR SHAPING THE CURVE – LESSONS LEARNED

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Summary

Can we establish the guidelines that make our designs into a success? Is there something like the Golden Ratio for shaping the curve? The Golden Ratio is a common mathematical ratio found in nature, which can be used to create pleasing, organic-looking compositions. This is used for the overall shape and proportions in bridge design. In our practice and in modern-day bridge design we see more and more curved bridges. Especially with the rise of parametric design a whole world opened up for (more) complex curved designs. Curviness (either vertical, horizontal or both) is not just a nice aesthetic feature. We encounter design principles that need to be taken into account to get to the ultimate elegance that we thrive for in our bridge design.

In our practice, shaping the curve of a bridge is a recurrent topic in the design process – from concept to realisation. From the forming of the (3D) *alignment*, it's about how curves fluidly connect. It's all about the radius, diameter, arcs, splines, offsets and the way to connect with tangents and sinusoids. This is best shown by the Lucky Knot and the Zaligebrug by NEXT architects. We also experienced the difficulties during construction phase and learned to control dealing with the unexpected.

With a series of case studies from our own bridges we show the importance of precision in shaping curves to make a design that is both natural and understandable to the eye of the user. If done right, curves seem logic and right; but if done improperly, it ends up as a disaster.

Keywords: Aesthetics, shaping/form, curves, fluidity, 2D to 3D, User experience



Fig. 1. Lucky Knot Bridge Changsha, China (NEXT Architects)