Timber Tectonics in the Digital Age

Walker's PORTFOLIO

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Beams and Columns

Looking Pre-tensioning of Mass Timber Specifically

Case study: Formby Swimming Pool

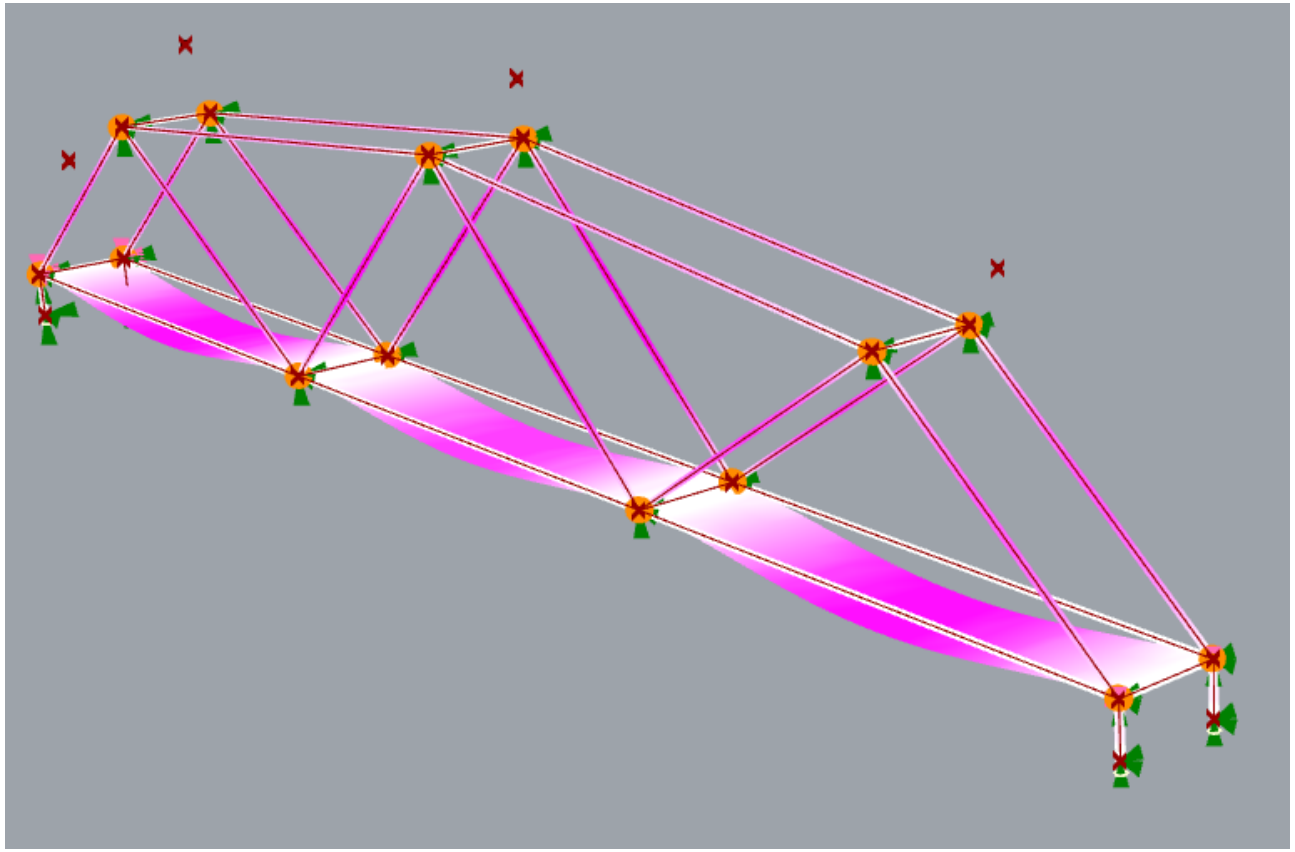
Writer's words: "The bottom chords of the trusses included a
facility to pretension the truss to remove dead load deflection and sag from the tie rods."

I'm assuming the writer was referring to the steel cables as the "bottom chords". I'm quite familiar with pre-tensioned concrete, which has the tensioning fibers within, but until now I never realized (now it seems so obvious) that you could externally pre-tension timber beams like this

Tamedia Builidng

This building opened my eyes to the possibilities of mass timber, in this structure the entire structural shell (columns and beams) are made of timber. In and elegant, sexy and functional design.

frames and trusses



With this experiment I wanted to look at trusses while also explore the mesh function. As you can see, after loading the mesh “road” surfaces droop below the truss frame. I struggled to try and have the bottom cord of the frame act together with the mesh road surface, but I will have to continue to experiment.

RHINO / GH

Timber Trusses have been used for millennia to span gaps. They continue to be a strategic solution to maximize the abilities of the wooden material

Fig. 2: The HolzBau Pier – a) elegance in terms of architecture, b) and c) in terms of details

frames and trusses

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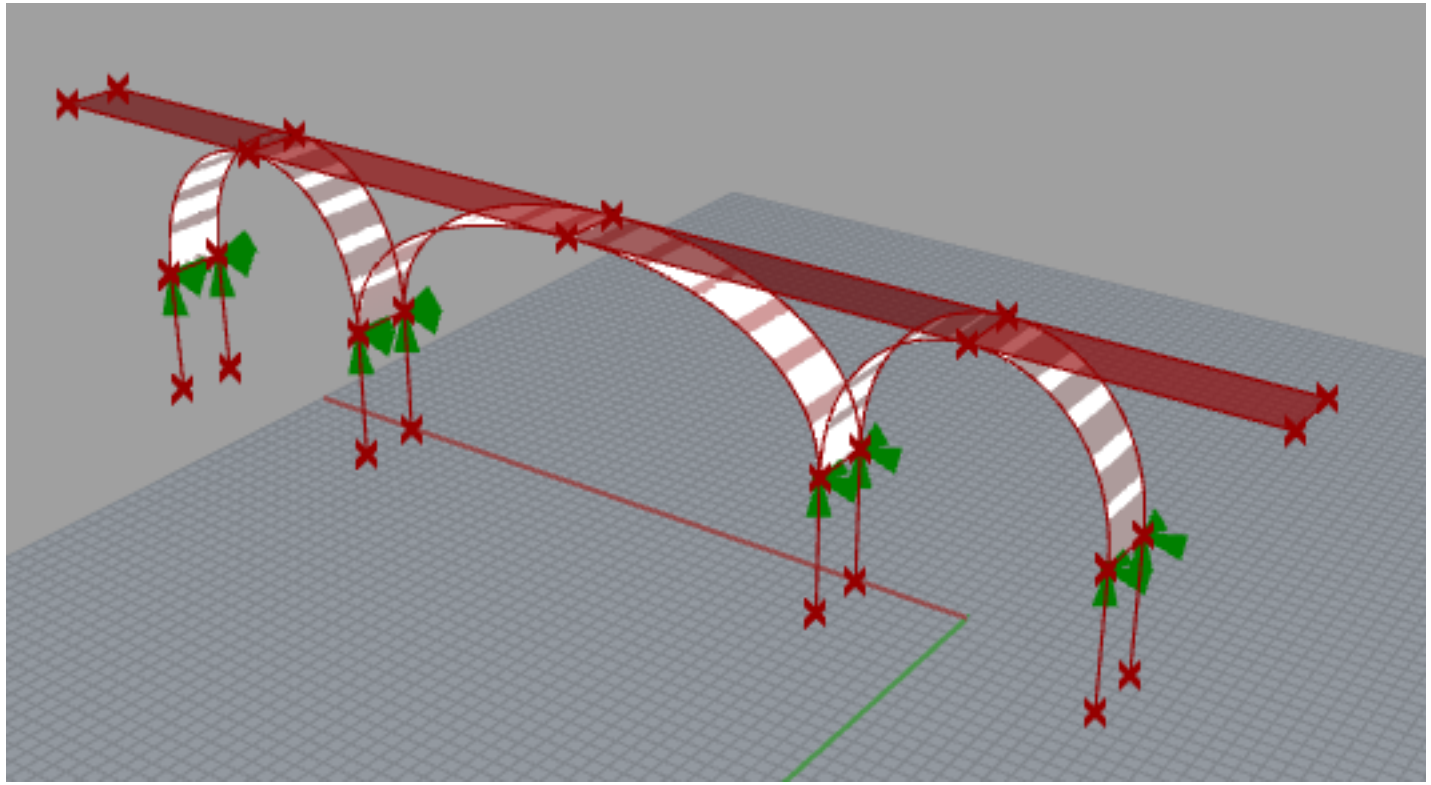
arches and domes

These massive 1/2 arches were prefabricated and then brought onsite, only requiring a 4 man crew to erect. Through the use of Large spanning arches that are pre-fabricated, repetitive pieces construction time and costs can be greatly reduced.

The Winter Garden, Sheffield

arches and domes

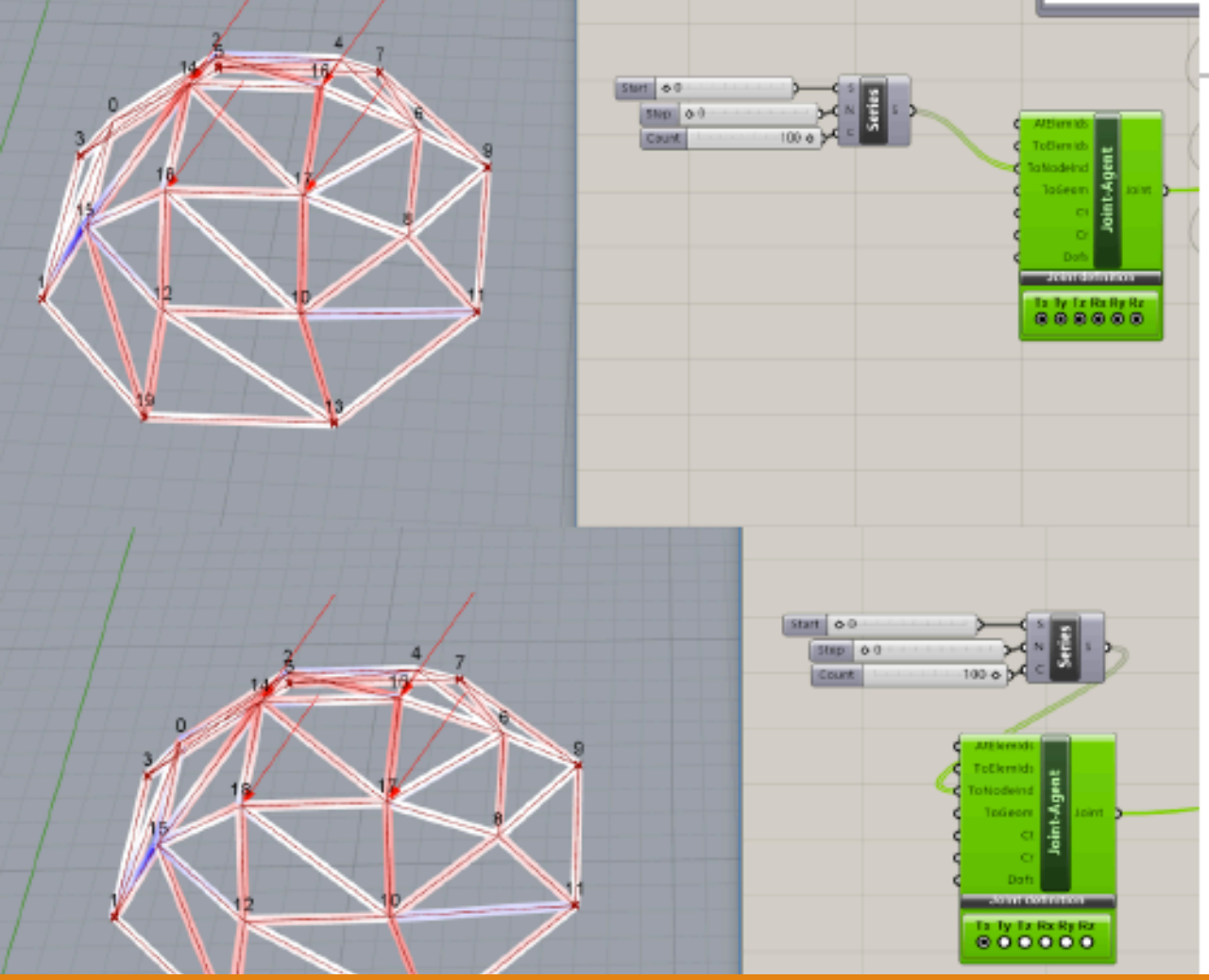
Rhino / GH experiment 2



This model isn’t fully developed. I struggled to create meshes between the curves to form the arches. My goal is to put a surface load on the “road” that flows through the contact points down through the arches down through the columns to the supports

Mannheim Bundesgartenschau Multihalle

Mannheim Bundesgartenschau Multihalle`



In this Rhino Model I toggled between having only restraints in the x direction and then in every direction and blocking rotation on every axis and the different in stresses was very similar. Since the point loads have mostly an X-Vector of force this makes sense.

Shells & Grid shells

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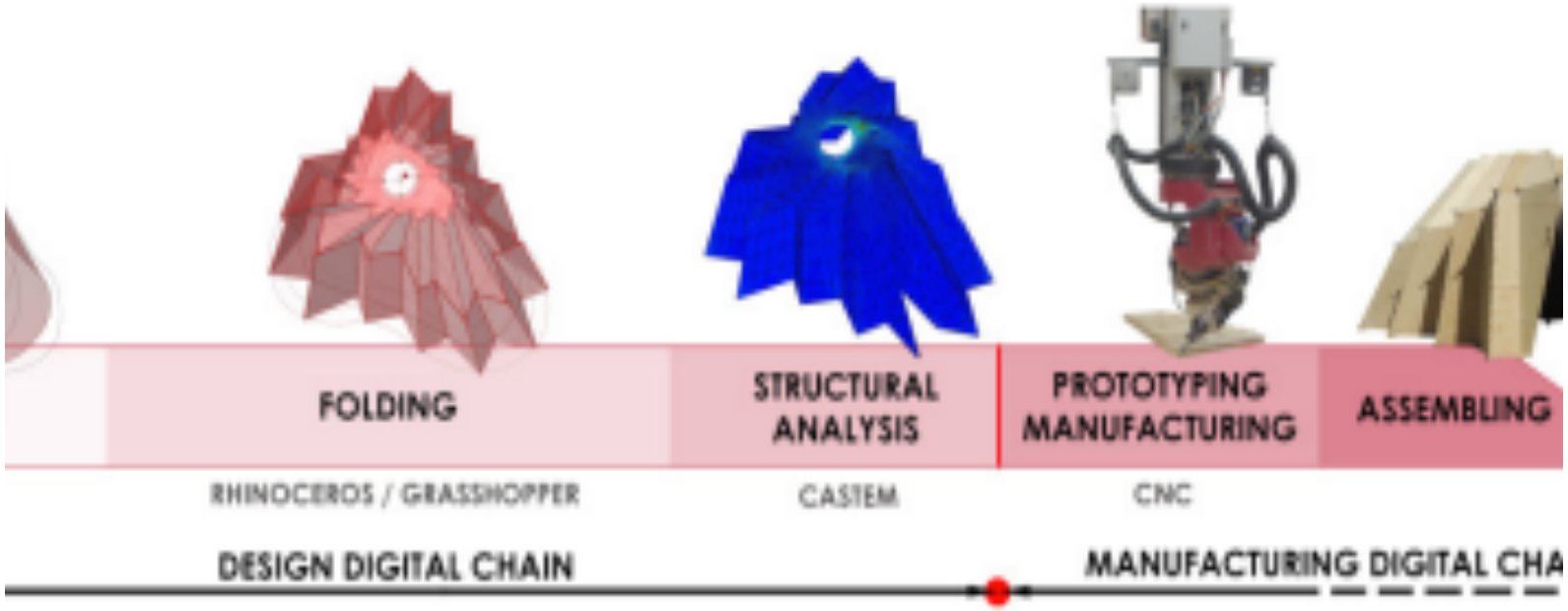

Meyer at al. CAADFutures

As digital structural design continues to evolve we will see more and more complex shapes in structures. Through the use of parametric design from the concept stage to fabrication, the precision and efficiency will only increase. Forms that are both aesthetically complex & appealing also are functional.

plates and folded plates

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As I learned about Mass timber through is course many ideas formed in my head for our pavilion design. One thing that helped guide my structural decisions were the hybrid marriage of steel and timber to get amazing results. Using the strengths of each to create and even more beneficial system.

Reflection

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