

# Advanced Timber plate Structural Design

create mesh design connected distance fact point number example timber construction 21st century  
change space boxes created multiple EPFL order set given beam built fabrication even  
proposed simple assembly sequence Grasshopper introduced folder data set essentially architectural made right box component engineering design  
plate additional several architect consideration structural engineering place computed top parameter position open segmented timber input surface process application provide overall box component geometries simply scale  
method meaning arch 20th century produced step timber panel applied degree used kind must another slide introduce shown  
structural engineer performed integrally attached direction vertical called data component concrete name force code construction material fold third  
line work build shape plane project take model time whole load isots building angle single cut something represent pattern finite element structural system behaviour mean type form  
layer assembled performance next macro model inaudible detail montage attached timber Rhino developed arches curved full taken already case display associated  
wood wood polyline wood connection second information term speak instance small  
different without four integral attachment

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**Video**



**EPFL**



My name is Yves Weinand. I'm a trained architect and structural engineer. I'm a professor at EPFL, École Polytechnique Fédérale de Lausanne and I'm the Director of Laboratory for Timber Constructions, IBOIS. Welcome to IBOIS. Back in 1979, timber was added to steel and concrete chairs as this chair of timber construction. Timber had a bit disappeared during the 19th and 20th century because engineers would prefer iron and steel during the 19th century and then concrete during the 20th century. And we feel that in the 21st century timber, as in very ancient vernacular on old construction material, becomes [inaudible 00:01:01] products, but also [inaudible 00:01:03] timber that gained interest in the field of structural engineering and architecture. In 1979, Julius Natterer, a German engineer, was appointed here at IBOIS. He, to the '90s and the beginning of the 21st century, brought timber again into the 21st century. He would actually show that timber can be an engineering product. When I came to EPFL in 2004, I started to define three main impacts we would like to put [inaudible 00:01:39]. The first one was to create an appealing design for timber construction and to detach it from the more classical image of the chalet.

Notes

Summary

0m 04s







The second, to reduce the biomass and really to use the maximum of it. And third, we would like to have an integral approach at the intersection structural engineering and architecture around this material. The first thing we did in 2004, also to form a team made out of architects, structural engineers, mathematicians, and computer scientists, was to design and to build this space. We produced the architectural drawings. We produced the execution drawings. We produced the fabrication code and already fabrication constraints came in. And we built this interior space in three days. From there, we had several research lines and one of them concerned timber plate structures. Last year, we were able to publish this book, *Design of Integrally-Attached Timber Plate Structures*, where not only we present new types of timber plate structures, but we also provide them with integral attachment. This is something very natural to do with timber since you cut also into that material. The connections are created by substruction of the material, and they are created at the same moment when you actually cut out the panel itself. This is very contemporary because it gives us assembly and easily disassemble building as we produce them now.

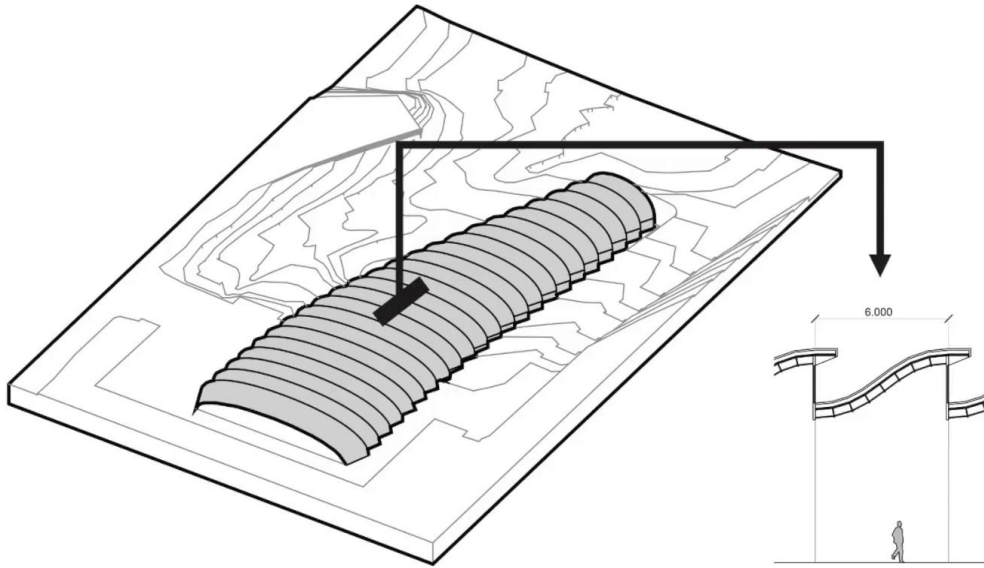
Notes

Summary



1m 51s

# Study Case: Double-layer Timber Plate Shell

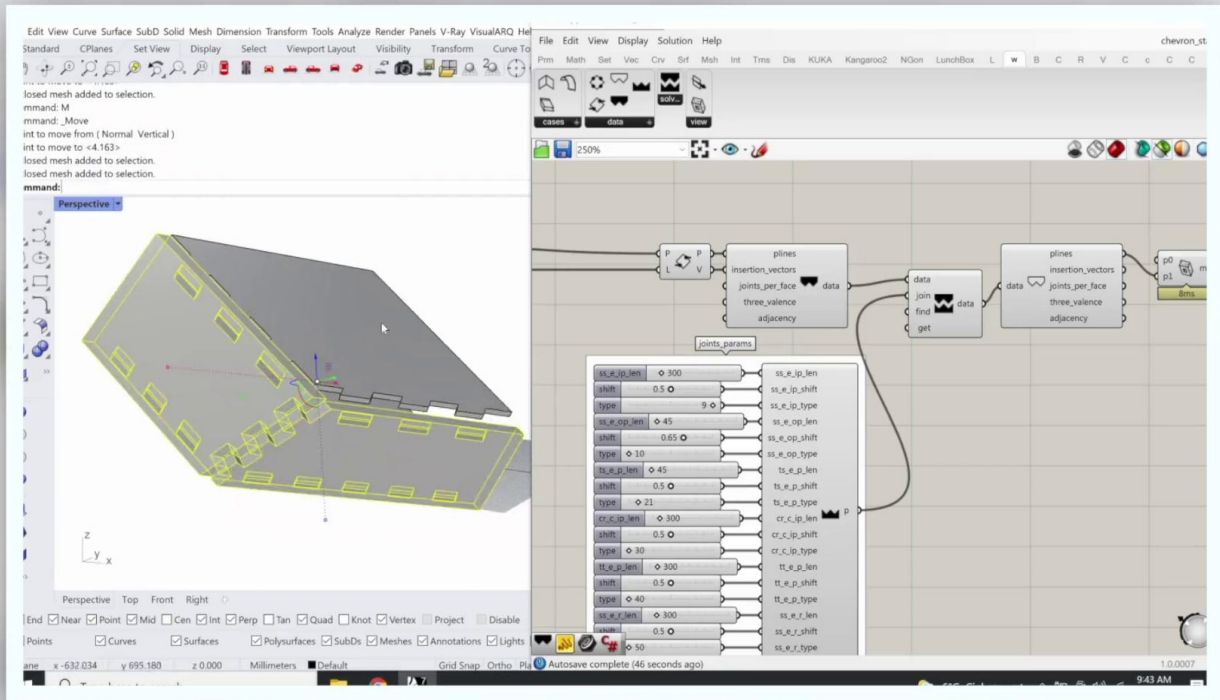


We brought those integral attachments on the level of construction and conceptual structure design. Hello. My name is Petras Vestartas. I'm an architect and postdoctoral researcher at IBOIS EPFL i'm going to present three parts at the current MOOC structure.

Notes

Summary





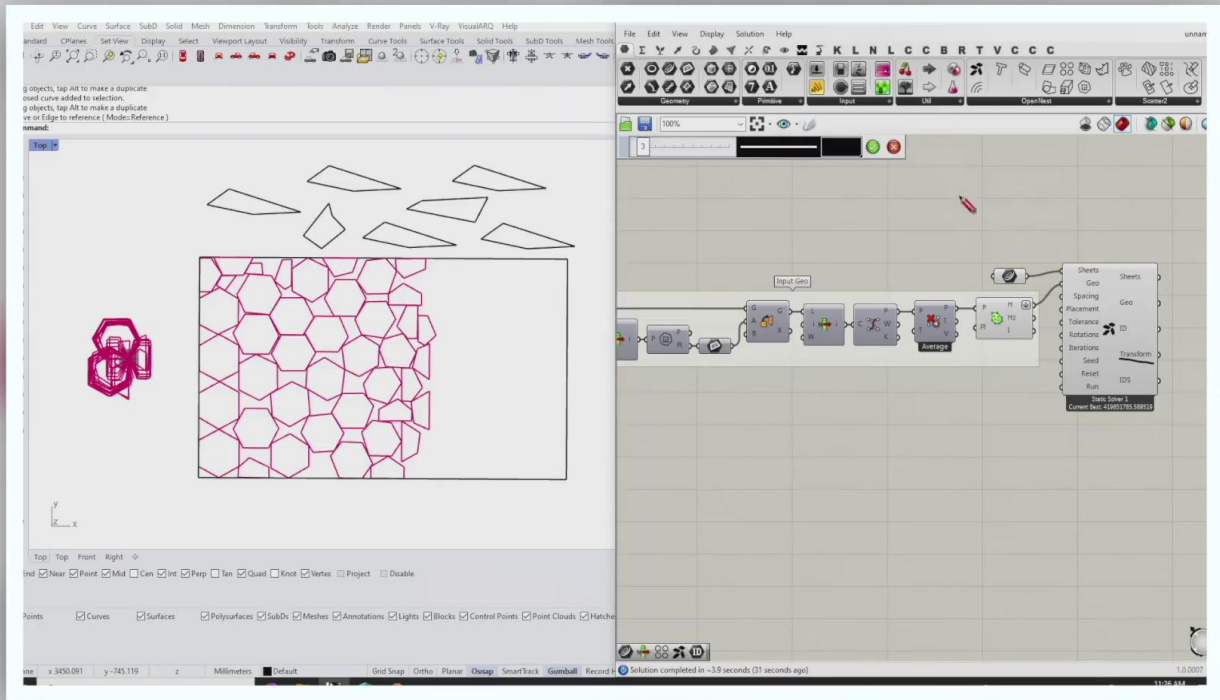
In the first part, I'm going to speak about geometry of the segmented timber arch, also known as an [inaudible 00:04:11] project. In the second part, I'm going to show how we can generate this geometry using compass wood library in two different applications. In one application, we are going to use Rhino and Grasshopper.

Notes

Summary

4m 04s



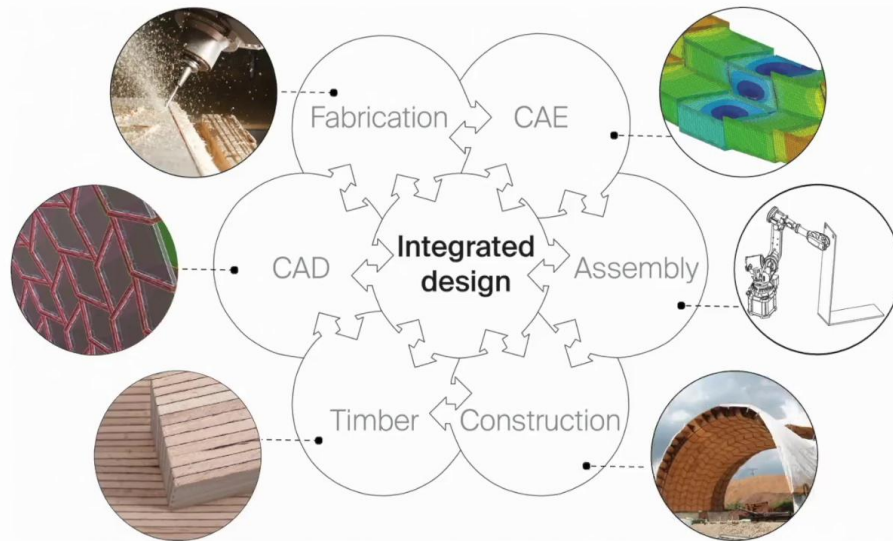


In the second case, we are going to use a standalone example using a Python language. In the third part, I'm going to show how we can nest those timber panels using [inaudible 00:04:34] tool.

Notes

Summary





Then I'm going to speak about the fabrication, how we can fabricate timber joints using our double tool for CNC cutting. Hello and welcome. My name is Aryan Rezaei Rad. I'm a structural engineer, and in 2020, I received my PhD in Civil Engineering from EPFL.

Notes

Summary





# Advanced Timber plate Structural Design

I am one of the instructors of this MOOC and I will be mainly talking about wood-wood connections and timber as a construction material and structural engineering design aspects in integrally-attached timber plate structures throughout the MOOC including simulation-based science and numerical methods such as finite element method and macroscopic modelling approach in timber plate structural systems and data transformation from architectural design to engineering design together with their application in real-world problems and constructions.

Notes

Summary



4m 57s