

Video





Another example of a prototype at IBOIS is the Nabucco Opera in Lausanne Cathedral, a segmented spiral with interconnected timber elements. During the Nabucco Opera in 2018, and in addition to the snap feet wooden benches, the technological developments in wood-wood joinery was extended to an innovative geometry. In particular, an irregular, segmented five meter spiral using interconnected timber plates was presented. As shown here, the scale of the spiral was chosen by the minimal bounding area of the central vault. The spiral geometry is derived from a cone shape, whose central axis and associated angle are used to position stairs within a user-specified angle and stair width.

Notes

Summary

0m 04s



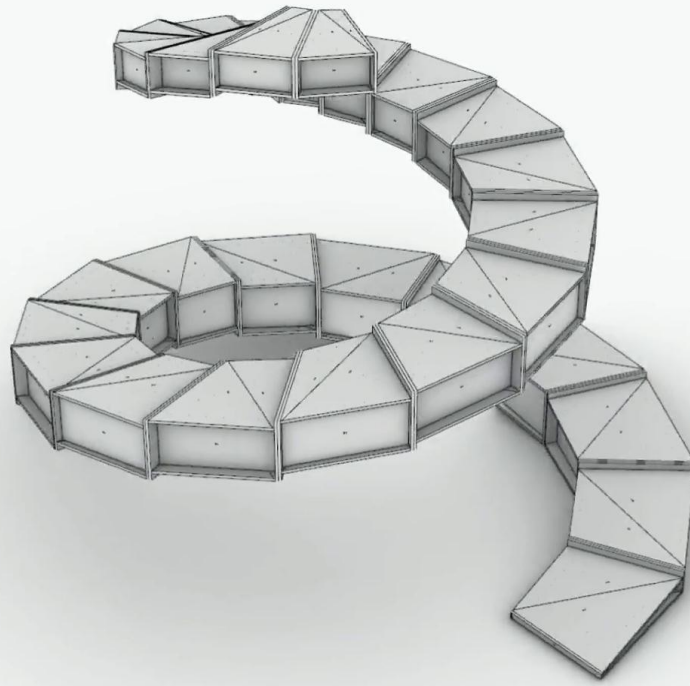


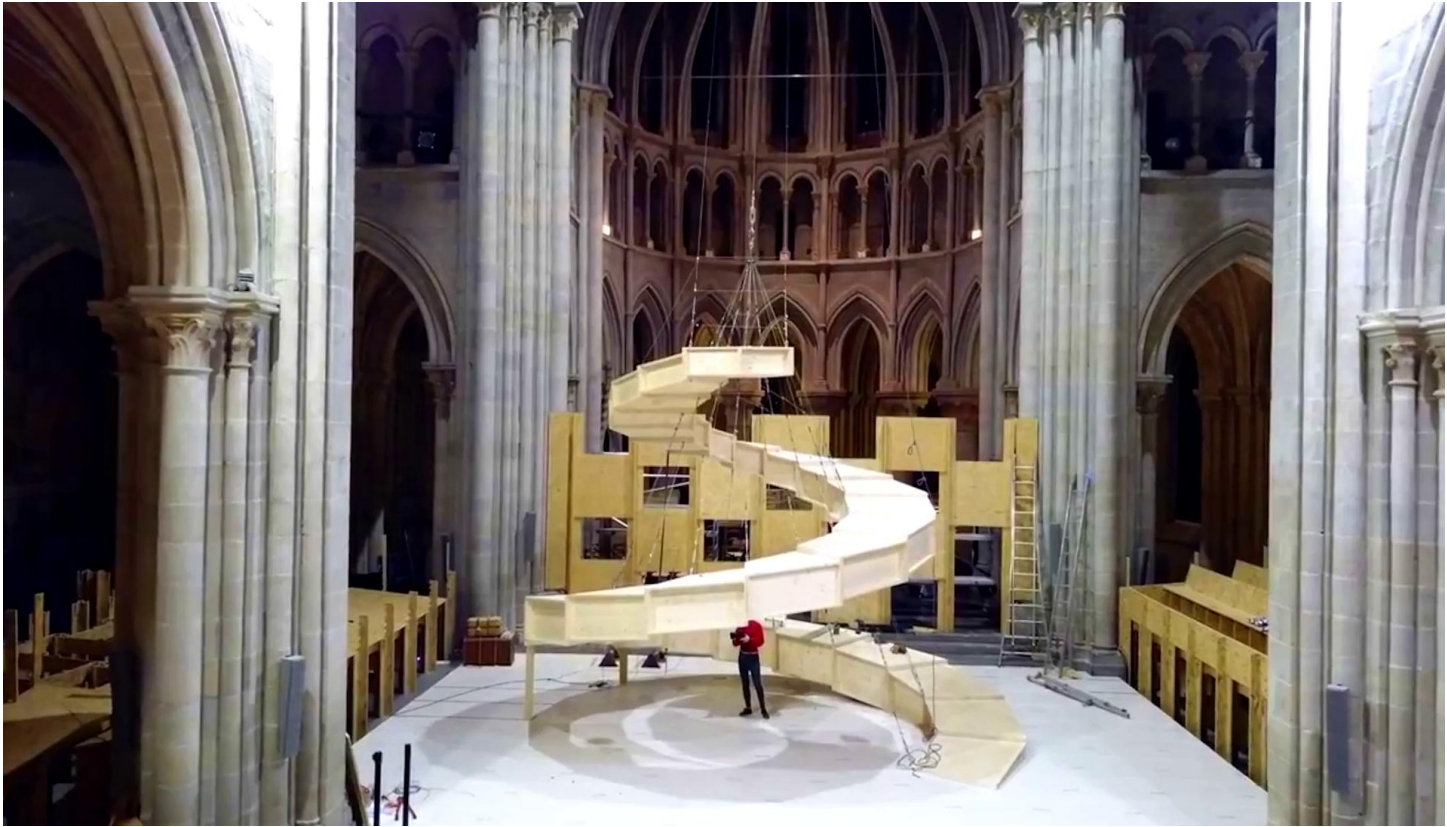
Plate Model

The structure was composed of 29 timber boxes made out of three plies CLT spruce panels.

- Notes

Summary





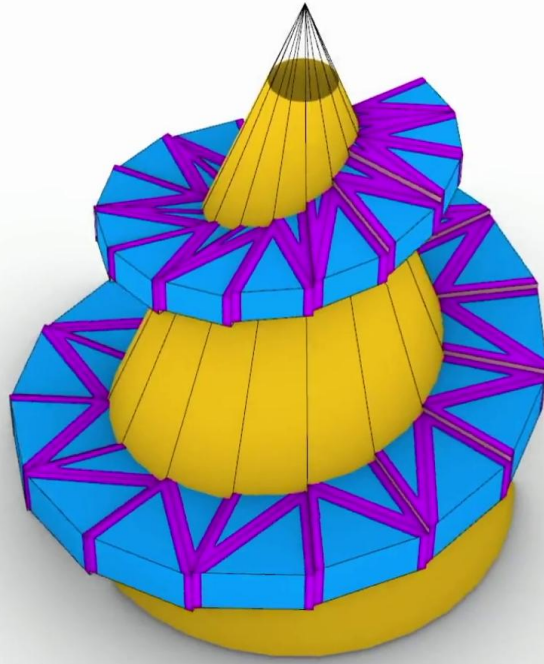
Those plates are connected with integral wood-wood connections. The boxes are then screwed together and suspended by cables. Above the spiral, the cables are fastened to the cathedral roof, which stands 30 metres higher than the top box.

Notes

Summary



1m 15s



FEM Model

Initially, a low poly mesh model is used for fast design iterations. The automation of geometric generation was then carried out in Rhinoceros 3D.

Notes

Summary



1m 30s

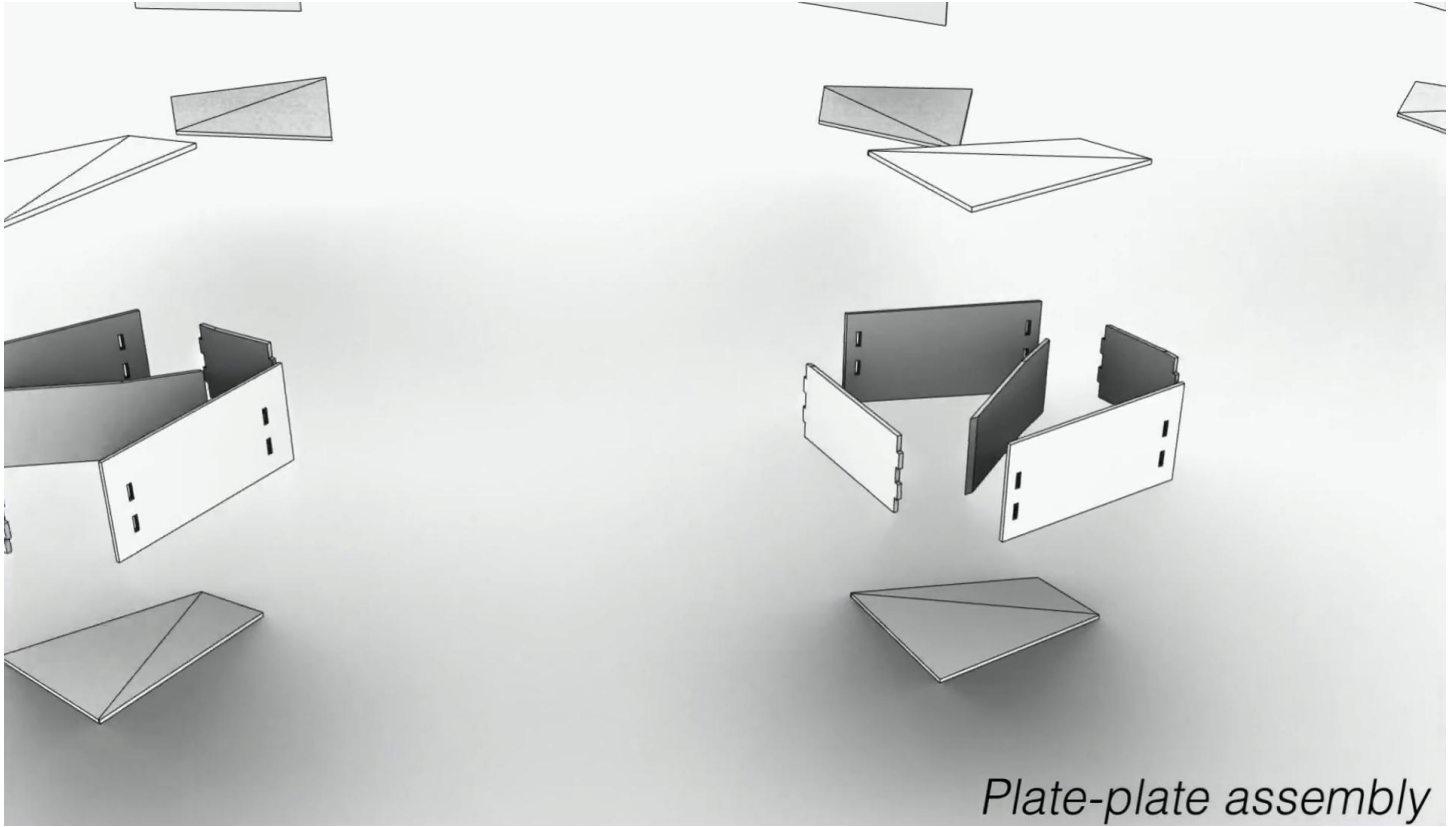


Plate-plate assembly

The nesting of orientated plates was performed using open source, open nest grasshopper add-on. The custom G-code tool select geometrical elements such as lines drilling, outlined for cutting, text for engraving. Furthermore, the 3D model contains the information associated with the [inaudible 00:02:02] on boxes. This, in particular, gives information about the location of the through tenant joint, screws and holds, and the position of doors. Within the CAD geometry generation, thickness of pens, assembly sequences, joinery, finger joints and screws, labeling, orientation to CNC machining space, and G-code toolpath generation are created, and those pieces of information are sent to the CNC machine.

Notes

Summary

1m 41s





Four axis was used for cutting panel outlines, drilling holes for schools in the walls. Engraving panel indicates cable in nets. Furthermore, the G-code toolpath was automated from design to fabrication within the same software interface. The assembly process was carried out on site. While the fabrication process took only two weeks. The assembly of 263 timber plates took three days.

Notes

Summary



2m 32s