ADAPTIVE TIMBER

Parametric Design and Fabrication of a Hygroscopic Timber Sculpture

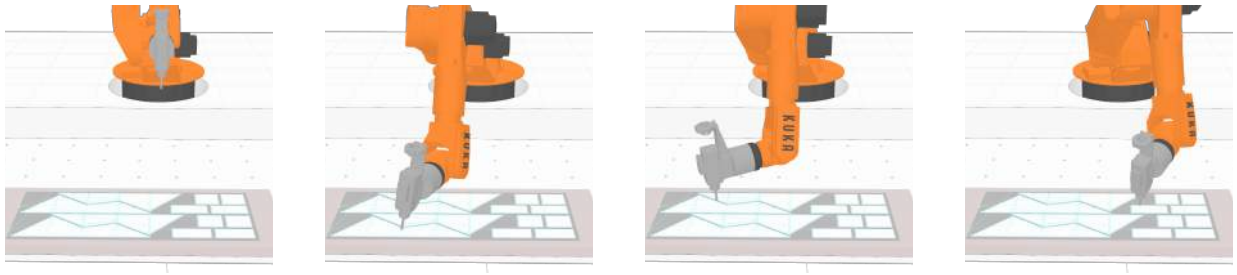
Photo: Gordon Koelmel

Developed under researcher Marie Davidová, “POL - AI is a responsive wood insect hotel with its own pollinator garden.” The hygroscopic panels covering the piece warp in response to changes in weather, opening at different times to allow pollinators to enter. The structure is composed of 128 unique pieces of 8mm thick plywood, all with non-orthogonal perimeter cuts in order to support the angled and layered panels. Because of the complexity and variety of all the pieces, a robust parametric model and design to fabrication workflow was needed to effectively fabricate the sculpture.

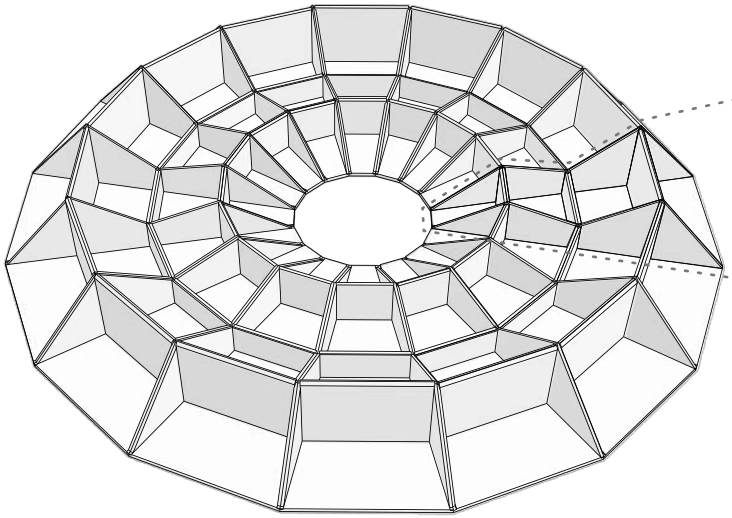
Main contributions

- *Production of sculpture sub-structure*
- *Parametric toolpath generation and robot path planning*
- *Parametric model development of global geometry from rough designer concept and sketches*
- *Parametric generation of auxilary details such as labels, material screwdown locations, and custom nesting*
- *Robot operation and milling*
- *Assembly, installation, and general carpentry*

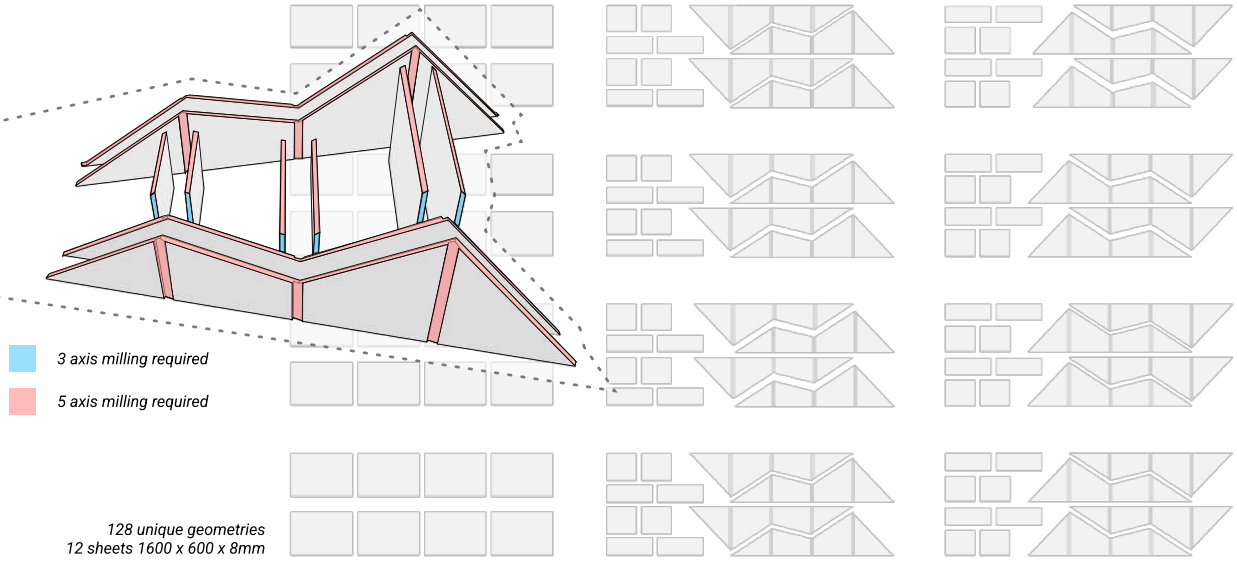
Robotic milling of structure with 5-axis perimeter and pocket cuts



Toolpath generation and milling simulation



Parametric model of sub-structure



Parametric organizing, nesting, and labeling of geometry