

Title: "Tiger CNC"

Course: Computational Design, Spring 2022, FabLab NUST "MISIS"

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Github: <https://github.com/m112521/tiger-cnc>

Github Wiki: <https://github.com/m112521/tiger-cnc/wiki>

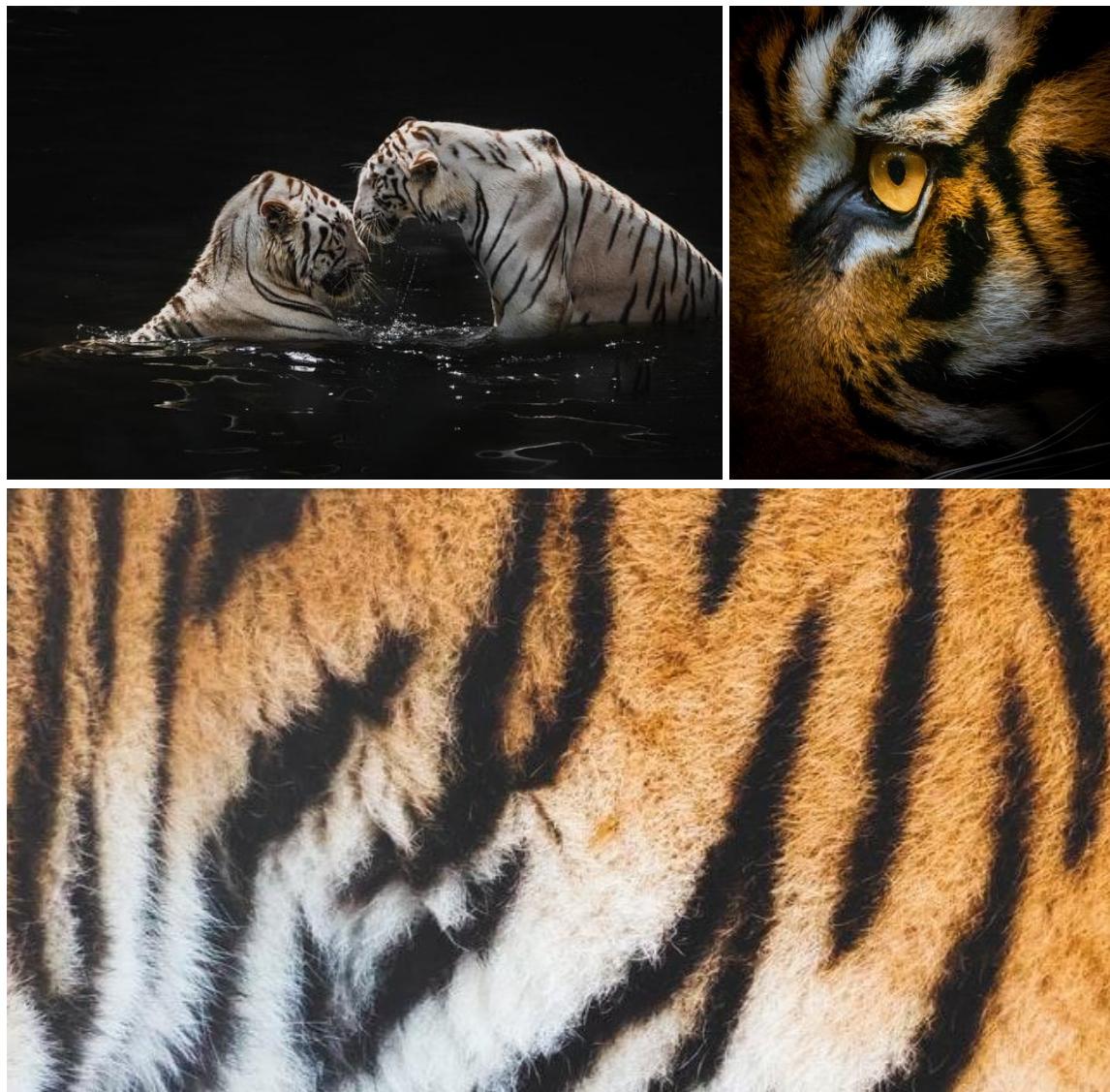


Description

This project was developed as an introduction to parametric design using graph-based algorithmic software (Rhinoceros 3d & Grasshopper). The formation of patterns in nature has been studied, and some examples have been digitally recreated and then transferred to the physical world as an object of specific application.

Inspiration / mood board

This project was inspired by the natural patterns on the skin of big cats, in particular tigers from different regions of the world:



Pic. 1 - Moodboard

Materials and machines

Material	Price, rub
2x Sheets of birch plywood 300x200x18 mm	152
1x Sheet of birch plywood 300x200x12 mm	93
1x Sheet of HDPE 300x200x10 mm (black)	350
1x Sheet of PVC 300x200x3 mm (red)	120
Glue	450
Итого	715

For routing FlexiCAM Stealth CNC and different bits were used:

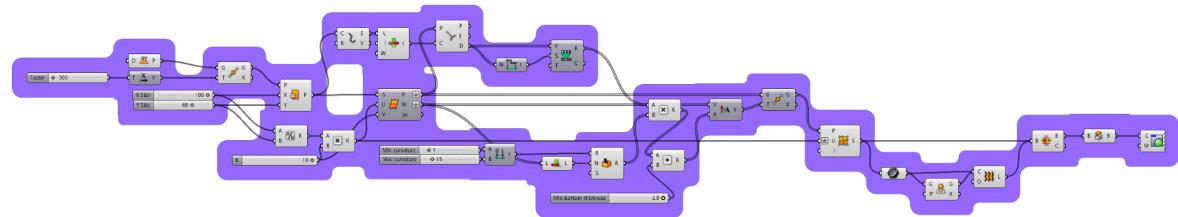
Regime	Bit type	Diameter	Length
Roughing	flat	12	60
Finishing	ball	6	40



Pic. 2 - 6 mm and 12 mm bits

Grasshopper algorithm

Parametric definitions were developed in grasshopper for volume creation, layering and collisions detection:



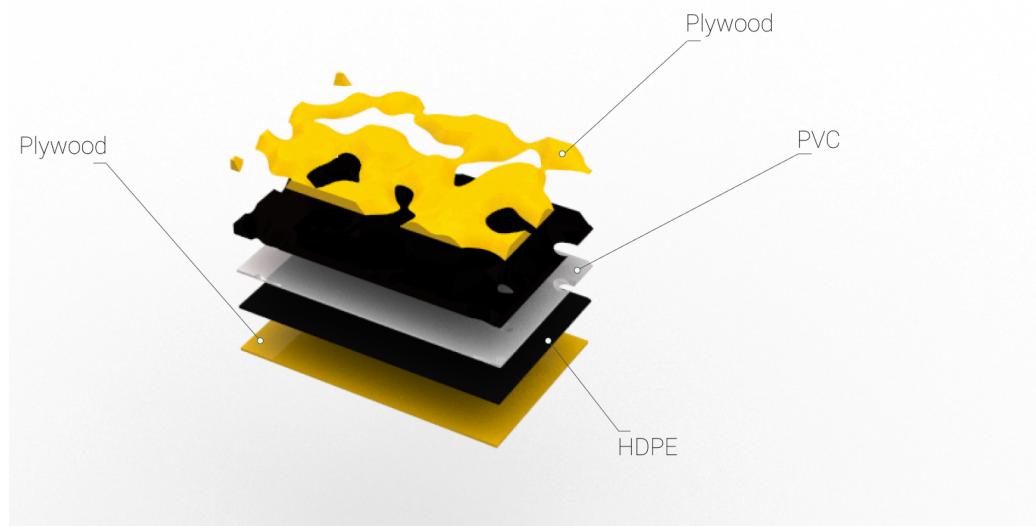
Pic. 3 - Grasshopper definition for layering solid model

Using grasshopper definition several patterns were generated:



Pic. 4 - Generated patterns

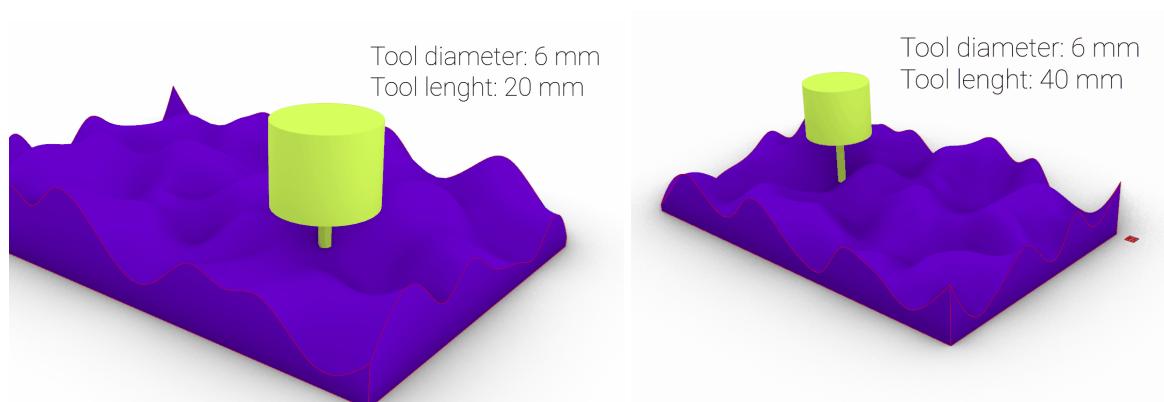
Explosion diagram



Pic. 5 - Separated layers of different materials used

Simulation

Collision detection has been tested for several bit lengths: 6 and 20 mm long.



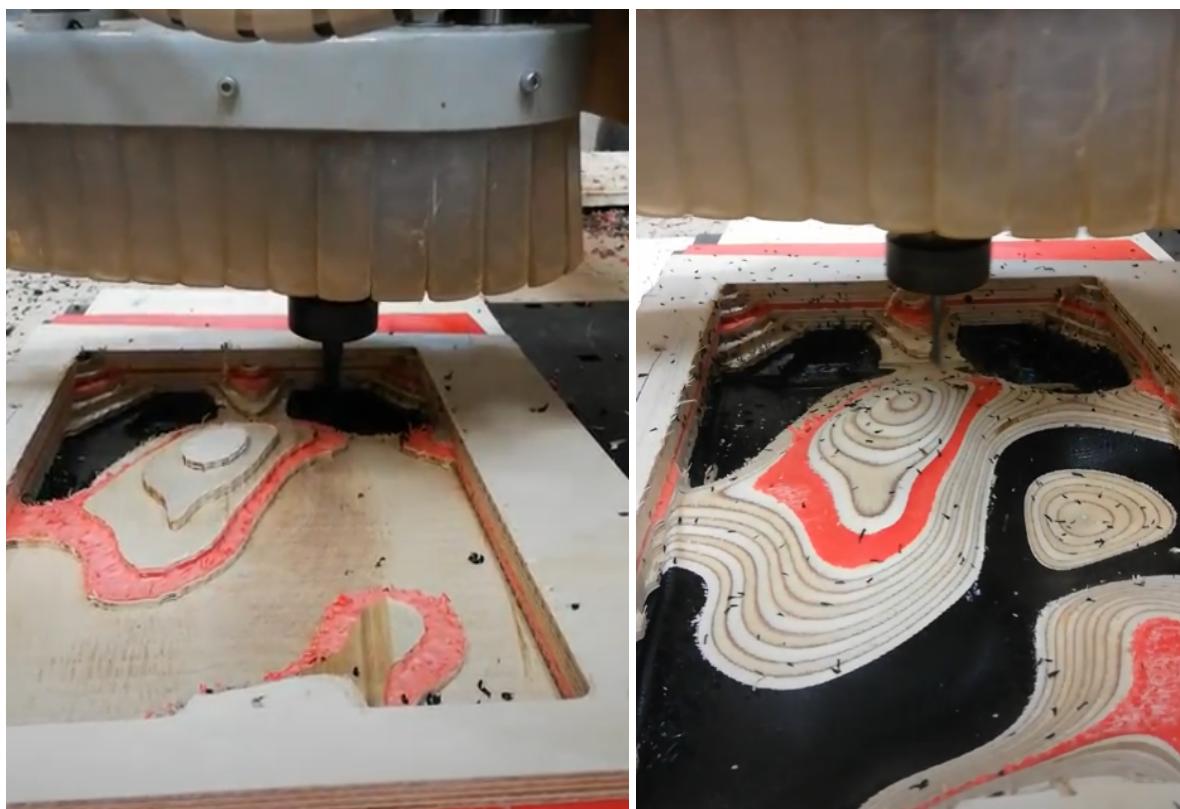
Pic. 6 - Collisions simulation while using bits of different lengths

Fabrication

Sheets of plywood, PVC and HDPE were glued together and then processed on FlexiCAM Stealth with 12 mm bit for roughing and 6 mm ball nose for finishing.



Pic. 7 - Gluing together sheets of different materials



Pic. 8 - Routing: roughing (left) and finishing

Results

Final result after polishing through layers:



Pic. 9 - Final results

Applications

Museum exposition. Tiles are mimicking skin patterns of the red list animals (from left to right: tiger, zebra, posh people):

