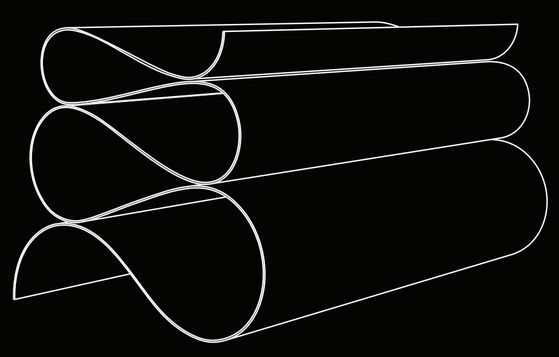
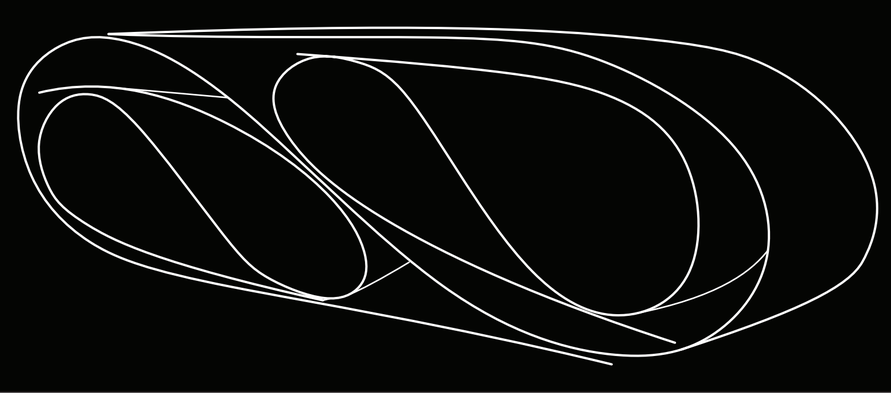
Matrjoschka

Cotton/PLA-composite spring elements

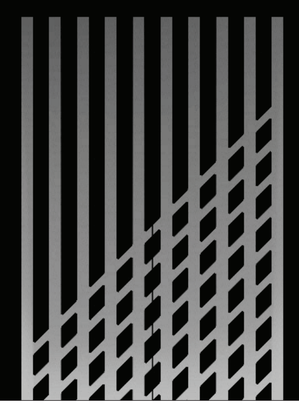
Early stage



Final design



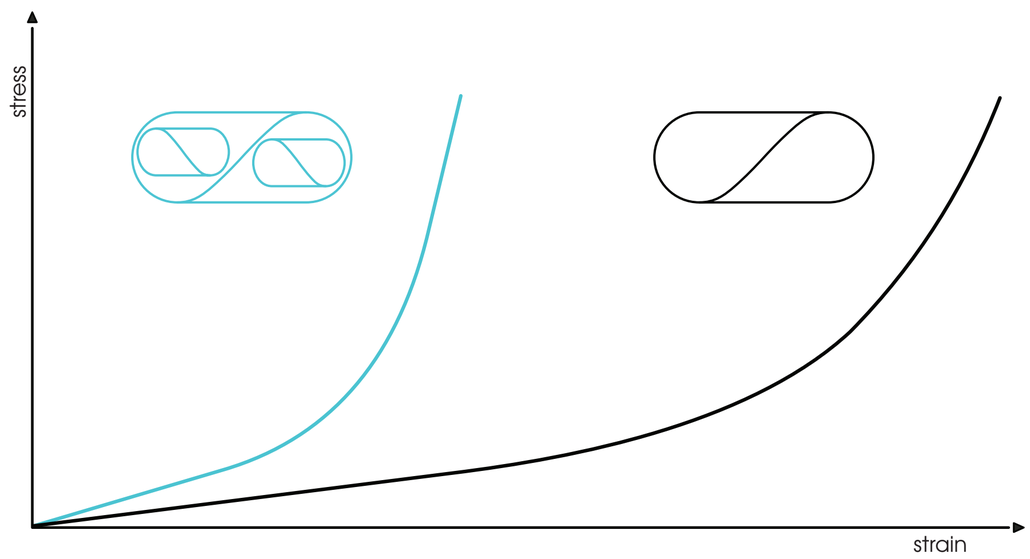
PLA-structure



The spring element

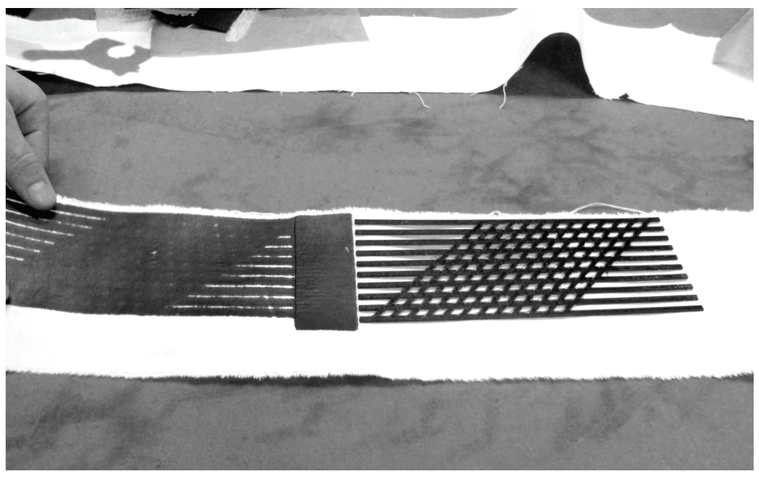
Spring elements made from composite materials are increasingly being used in automobile and aviation industries. The aim of our collaboration between the FIBRE Institute Bremen and Bremen Cotton exchange is to experiment and develop a fiber composite spring element made of cotton and biodegradable plastic PLA which is mostly obtained from milk (lactic acid). Due to the enormous strength of fibre composites, spring elements made from this material are very stiff and have a relativly short suspension travel. So we finally decided to use a loop design which form and properties are inspired by an old school leaf spring. Cotton fibres and PLA-matrix are melted together under pressure and heat. We produced models with this method and did some stress tests with them at the FIBRE institute Bremen. The stiffness can be modified by increasing or decreasing the material thickness. To increase the working load there can be put smaller spring elements into the two gaps of the loop design too. Depending on the properties of the additional smaller elements, even progressive springs coud be possible.
„Matrjoschka“ uses this this elements and properties for a room saving biodegradable furniture system. The bouncy stools can be stored into the gaps of the table element.

Stress test

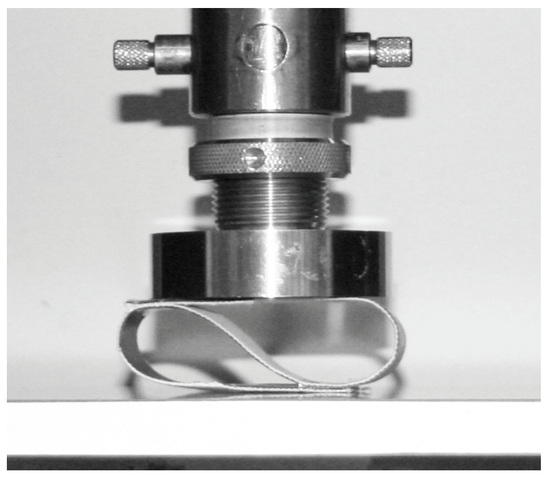


3D-printing of the PLA structure

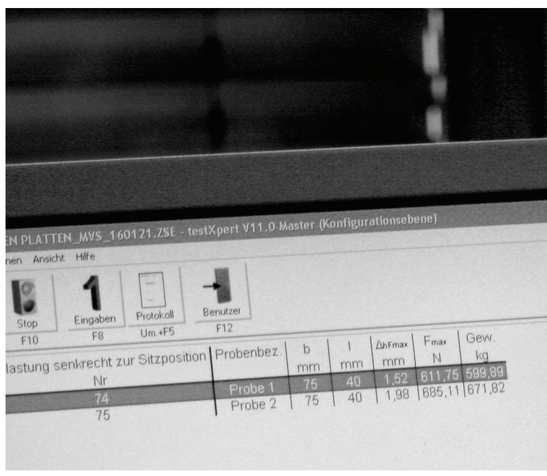
Melting process of fibres and PLA structure



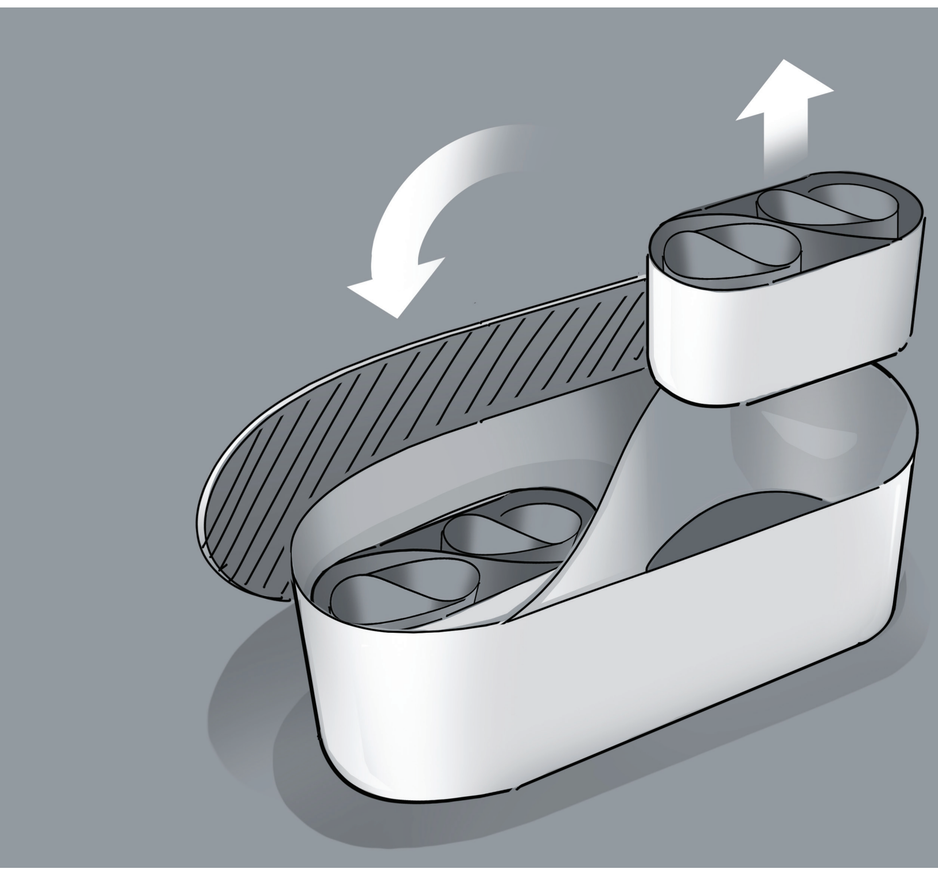
Stress test

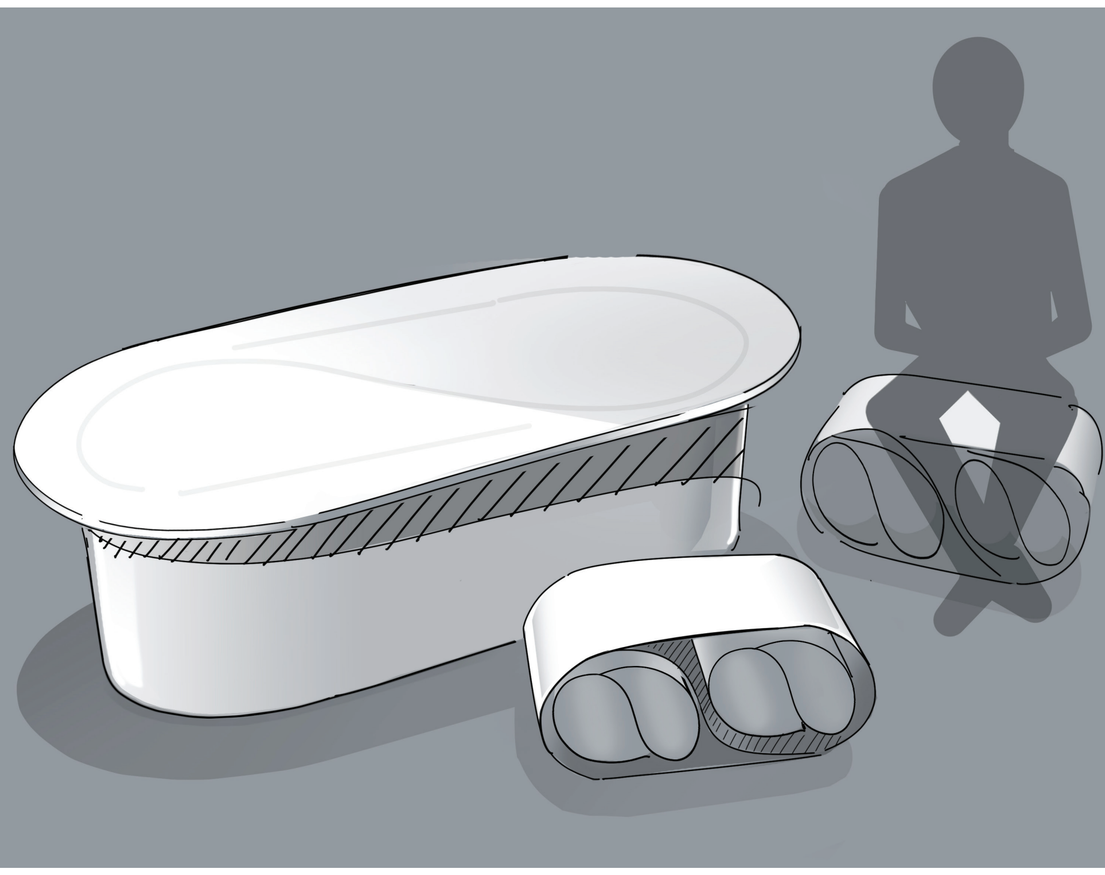


Extrapolation of stress test results



Furniture system: storing of the stools inside „Matrjoschka“





Kirsti Masnick
k.masnick@hfk-bremen.de

Björn Becker
watermade@icloud.com

FASERINSTITUT FIBRE BREMEN

Universität Bremen

BREMER BAUMWOLLBÖRSE SEIT 1872