B.Sc. & M.Sc. Programme
Department of Architecture KIT
Seminarwoche
Summer Semester 2022
LV1720753

DIGITAL CRAFT

Course offered by:
DDF - Professur Digital Design and Fabrication
& DoS - Professur Design of Structures

IEB - Institute for Building Design and Technology
KIT - Department of Architecture

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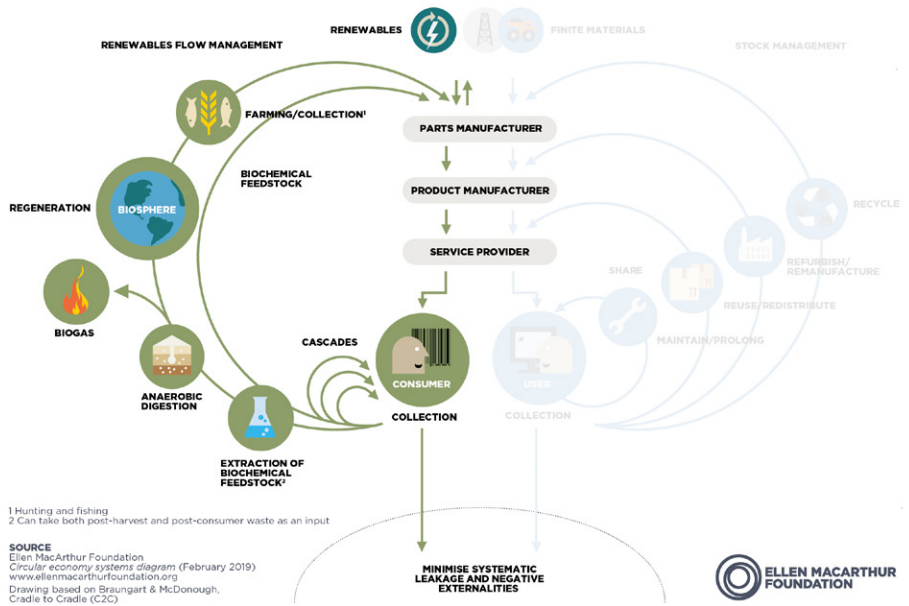
CONTENTS

01 INTRODUCTION AND CONTEXT



Circular economy diagram by Ellen MacArthur Foundation, here highlighting the biological cycle

The seminar week “Digital Craft” offers an opportunity to gain insight and first-hand experience in a digital design and fabrication system for the implementation of the circular economy in architecture and construction that is currently being developed within the research line “Digital Wicker”. It focuses on the creation of the first mock-up of the research demonstrator that will be developed in parallel in the master studio “Digital Wicker 2.0”, which will be displayed in its full form at the “Das Fest” festival in Karlsruhe in July 2022. This research demonstrator will showcase a construction concept that is based on circular biological cycles and is enabled by digital design and fabrication. Specifically, it will focus on the combination of earth-based and renewable plant-based resources, which can be returned to the biosphere at the end of their life cycle. At the same time, it will express a novel design and construction repertoire that emerges from the process.

Wicker turns digital

Traditionally, wicker weaving is a technique where long thin sticks, stems or reeds are woven together to make baskets. It represents an important analogy of how to exploit geometry and textile techniques to give structural stiffness not otherwise inherent in the materials. Additionally, it expresses the intention of looking back at local, renewable materials and techniques that used to be part of the architectural and construction repertoire but have been sidelined in the first industrial revolution. In light of the fourth industrial revolution, envisioned as a fusion of technologies blurring the lines between the physical, digital and biological spheres, digital design and fabrication can sustain the industrialisation of natural materials. Thanks to their versatility, digital production techniques enable architectural components that are designed and fabricated with a high resolution and articulation of structure and materiality but also of graded transparency and rich visual details.

02 AIM

Digital construction mock-ups, showcasing the potential of the system

The aim of the seminar week is to create two to four components made of a combination of fast-regrowing and earth-based materials that will showcase the implementation of circular biological cycles as an alternative to conventional construction methods and enable the exploration of a novel design repertoire which is driven by digital fabrication techniques and innovative structural solutions. These components will be assembled together at the end of the seminar week to create a mock-up, a temporary structure that showcases the potential of the digital circular construction system at 1:1 scale.

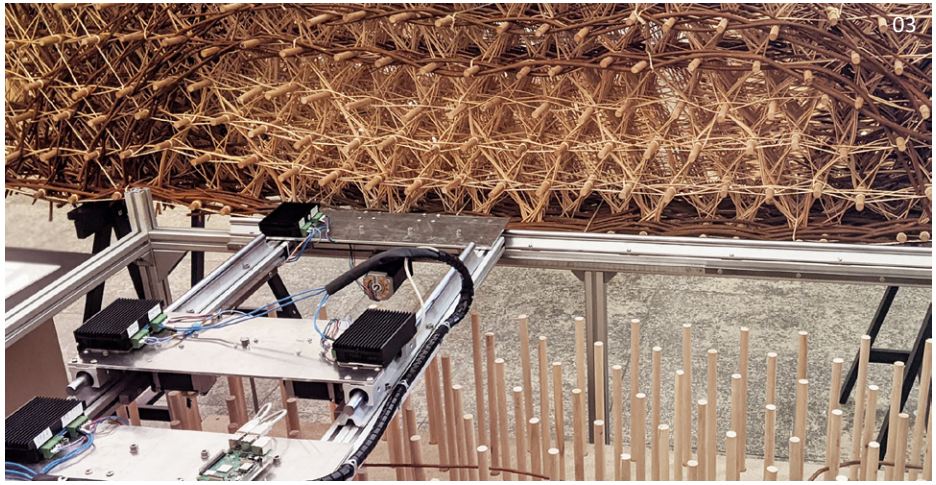
While the seminar week is based around the production of the mock-up, students will gain first-hand knowledge and experience in all aspects of the project, from computational and structural design to materiality and digital fabrication.

03 METHODS AND DEVELOPMENT

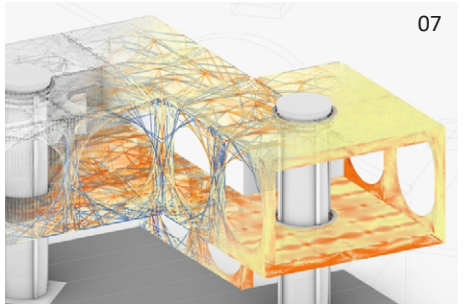
At the intersection of research and teaching, the seminar week will alternate between theoretical input and design and hands-on application, showcasing how the two spheres continuously relate to each other in a design-through-making and prototypical-oriented vision. Organised in groups of 5-7 people, students will engage with a different topic every day, thus gaining a deeper understanding of all parts of the project: from learning how to use computational design to create their own small design, to implementing tools for structural design, to understanding first-hand the materiality, to producing a component with digital fabrication techniques.

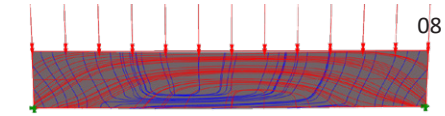
No prior knowledge is required.

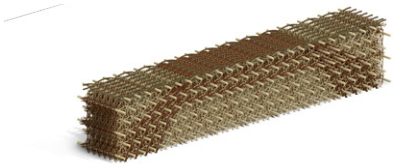
	DAY 01 07.06.2022	DAY 02 08.06.2022	DAY 03 09.06.2022	DAY 04 10.06.2022	
INTRO	**GROUP 01**				ASSEMBLY
	DIGITAL DESIGN	HANDS-ON EXPLORATORY PROTOTYPING	DIGITAL FABRICATION	HANDS-ON 1:1 COMPONENT	
	GROUP 02				
	HANDS-ON EXPLORATORY PROTOTYPING	DIGITAL FABRICATION	HANDS-ON 1:1 FABRICATION	DIGITAL DESIGN	
	GROUP 03				
	DIGITAL FABRICATION	HANDS-ON 1:1 FABRICATION	DIGITAL DESIGN	ASSEMBLY PREPARATION	
	GROUP 04				
	HANDS-ON 1:1 FABRICATION	DIGITAL DESIGN	HANDS-ON EXPLORATORY PROTOTYPING	DIGITAL FABRICATION	
	GROUP 05				
	MATERIAL EXPLORATIONS AND TESTS	STRUCTURAL DESIGN	HANDS-ON 1:1 FABRICATION	STRUCTURAL TEST 1:1	
	GROUP 06				
	STRUCTURAL DESIGN	HANDS-ON 1:1 FABRICATION	MATERIAL EXPLARATIONS AND TESTS	STRUCTURAL TEST 1:1	

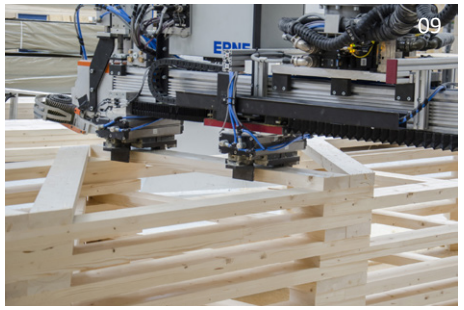


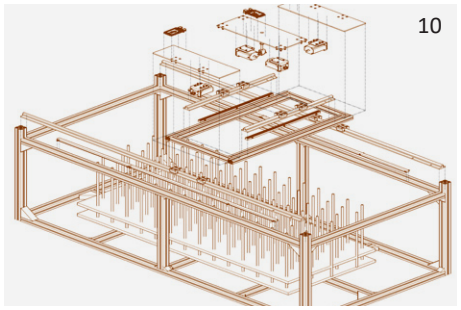
Some results from “Digital Wicker” in WS21/22, showing 1:1 prototype components and their digital fabrication system. These will be further developend in “Digital Wicker 2.0” and used as the base for the seminar week











Reference projects showcasing the range of topics that are part of the seminar week, from prototypes for material combinations, to structural design to digital fabrication

04 DELIVERABLES

HAND-IN – 13.06.2022
Individual

- Documentation of the different days and topics based on template by DDF & DoS (including photos of prototypes and their construction, quick design and concept visualisations, structural design)

05 SCHEDULE

Seminar dates:
Everyday from 07.06.2022 to 10.06.2022
10.00 am – 5.00 pm

Location:
DDF Fabrication Lab - Karlsruhe
Address will be communicated in due course

Month	KW	Week	Day	Date	Stage
June	23	06.06 - 12.06	Tu	07.06. Day 01	Intro
			We.	08.06 Day 02	
			Th.	09.06 Day 03	
			Fr.	10.06 Day 04	Assembly
	24	13.06 - 19.06	Mo.	13.06	Hand-in

06 REFERENCES

Images

01 https://iaac.net/iaac-wasp-new-3d-printing-strategies-towards-realisation-load-bearing-earthen-structures/

02 https://works.arch.ethz.ch/thesis/mesh-mould-earth-construction

03 Professur Digital Design and Fabrication (KIT)- Digital Wicker- Students: Thibaud Lhoest, Deniz Okurogullari, Clement Potier, Yannick Scherle, Paula Seifert

04 Professur Digital Design and Fabrication (KIT)- Digital Wicker- Students: Thibaud Lhoest, Deniz Okurogullari, Clement Potier, Yannick Scherle, Paula Seifert

05 Professur Digital Design and Fabrication (KIT)- Digital Wicker- Students: Michael Hosch, Michelle Montnacher, Elisa Muhr, Saskia Nehr, Otto von Zastrow-Marcks

06 https://www.itke.uni-stuttgart.de/research/built-projects/maison-fibre-2021/

07 Professur Digital Design and Fabrication (KIT)- Digital Wicker- Students: Thibaud Lhoest, Deniz Okurogullari, Clement Potier, Yannick Scherle, Paula Seifert

08 Professur Digital Design and Fabrication (KIT)- Digital Wicker- Students: Thibaud Lhoest, Deniz Okurogullari, Clement Potier, Yannick Scherle, Paula Seifert

09 https://ita.arch.ethz.ch/archteclab/sequential-roof-.html

10 Professur Digital Design and Fabrication (KIT)- Digital Wicker- Students: Thibaud Lhoest, Deniz Okurogullari, Clement Potier, Yannick Scherle, Paula Seifert