DESIGN-LED

PROTOTYPES

Forest and Wood Products Australia, Webinar
Nicholas Williams, 25th March 2014
A few of the many examples of architectural research pavilions utilising digital fabrication.

Clockwise from top left: DFAB, ETH Zurich, The Sequential Wall 2; Block Research ETH Zurich Catalan Shell, Institute for Computational Design Stuttgart, Research Pavilions 2012, 13 & 14, The Very Many, NonLin/Lin, Centre Pomidou, Alan Dempsey & Alvin Huang, AA, DRL 10 Pavilion, Neri Oxman, Silkworm Pavilion, MIT.
“... leverage digital design and manufacturing for perceptual, spatial and formal effect. These projects centre on a mode of inquiry whose method of making ultimately informs the design aesthetic.”


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“In architecture, digital fabrication technologies will not change building production without fundamental shifts in the social and market structures of design practice.”

- Kiel Moe, Automation Takes Command, 2006
Timber Sculpture,
Waldstatt, Apenzell, CH
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Waldstatt, Apenzell, CH
Timber Sculpture,
Waldstatt, Apenzell, CH
Timber Sculpture,
Waldstatt, Apenzell, CH
Timber Sculpture,
Waldstatt, Apenzell, CH
Forecourt Canopy,
D1 Tower, Dubai
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D1 Tower, Dubai
Forecourt Canopy,
D1 Tower, Dubai

Forecourt Canopy,
D1 Tower, Dubai

design-toproduction
Forecourt Canopy,
D1 Tower, Dubai

PROTOTYPES
FABPOD
An Open Design-to-fabrication System
Project Researchers:
Nick Williams, SIAL, RMIT University
Brady Peters, CITA, Copenhagen
John Cherrey, School of Architecture and Design, RMIT
Jane Burry, SIAL, RMIT University
Mark Burry, Design Research Institute, RMIT University
Daniel Davis, PhD Candidate, SIAL, RMIT University
Alex Pena de Leon, PhD Candidate, SIAL, RMIT University

Research Partners:
Memko Pty Ltd
Felicetti Pty Ltd
School of Electrical & Computer Science, RMIT University
AR-MA Pty Ltd

Project Support:
Design Research Institute, RMIT University
Property Services Group, RMIT University
The Independents’ Group, SIAL, RMIT University
The Australian Research Council through funding for the Discovery grant “Challenging the Inflexibility of the Flexible Digital Model”.

Project Sponsors:
Woven Image Echopanel
The Laminex Group
Sapphire Anodising
AR-MA Pty Ltd

Prototyping Research Assistants:
Nathan Crowe
Dharman Gersch
Arif Mohktar
Costas Georges
Andim Taip
Marina Savochina

Workshop Participants:
Matthew Azzalin
Aphiphong Chaichavalit
Jihun Kang
Thippanawat Sunantachaikool
Errol Xiberras
Xuanqi Yang
Lu Ping
Tuyen Tran
Ciara McGrath
Frank Mwamba
Robert Doe
Tom Hammond
Heike Rahmann
Jeremy Ham

Prototyping Support:
Andrew Miller, SIAL, RMIT University
Michael Wilson, SIAL, RMIT University
Andrew Thompson, RMIT University
Brad Marmion, RMIT University
Kevin O’Connor, RMIT University
The Sound Bites Shell

A prototype performance shell for sound art.
Multihalle Mannheim, 1975
structural engineer: Frei Otto
The Sound Bites Torus: A prototype performance shell for sound art
The Sound Bites Torus:
A prototype performance shell for sound art
The Sound Bites Torus: A prototype performance shell for sound art
Music Practice Rooms
SmartNodes
A common design problem: curved building geometries generate customised components.

image by Kristof Crolla
A common design problem: nodes connecting beams from many directions. Image by Kristof Crolla
Users of Rapid Prototyping technology have come to realize that this term is inadequate and does not effectively describe more recent applications of the technology... Many parts are in fact now directly manufactured in these machines; so it is not possible for us to label them as “prototypes”.

Collaboration in Design

- Architectural Design, Kristof Crolla and SIAL Research
- BESO Structural Optimisation, Prof Mike Xie & team
- Additive Manufacturing Optimisation, Dr Martin Leary & AMP team
- Integrated Workflows for Customised Manufacturing, Memko
- Structural Engineering and Buildability, Arup
Structural analysis showing loads and deflections per member.
Initial studies uses Karamba for direct feedback into the architectural design model.
Image credit: Daniel Prohasky
Node Design,
Starting Topologies and Examples.
Image credit: Nick Williams
Analysis for Buildability. Three key criteria were identified to allow simple fabrication with ‘complexity’ constrained to the nodes.

Image credit: Nicholas Williams
BESO Optimisation routine
Simulation and video by Prof Mike Xie and Hamed Seifi.
RMIT University
DESIGN/FABRICATION FACILITIES
nicholas.williams@rmit.edu.au

www.sial.rmit.edu.au