FLUID BODIES

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Rupert Zallmann and the Institute of Architecture at the University of Applied Arts Vienna (Eds.)

Fluid Bodies Methods for Casting New Esthetics

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METHODS FOR CASTING NEW ESTHETICS

Rupert Zallmann

Cast material becomes solid, yet, at its very origin, it is a fluid that can take on every imaginable body and shape. This simple but radical paradigm allows us to explore volumetric formations. By working with curing bodies, the notion of their formal rigidity gets fundamentally questioned, conventional formwork models get rethought, and new esthetics arise.

By replacing hard and rigid formwork that struggles to withstand the pressure of casting with flexible molds that allow the liquid to harden gently, we enable the viscosity of the material to interact with natural forces to form fluid bodies with gentle curvatures.

The non-existent or minimal formwork presented in this book are both inexpensive and easy to dispose of, replacing bulky, expensive forms that must be disposed of in hazardous-waste landfills. Concrete becomes a sustainable material when used with good design and minimal formwork, then its durability becomes its advantage as it lasts for centuries with little maintenance.

In the machine age of mass production, formwork, like plywood, is cut into flat panels with saws that are single-axis cutting machines. This reduced and simplified building element, with a uniform cross-section and prismatic volume, is welcomed by architects because it is easy to plan with, easy for structural engineers to calculate, and easy for builders to execute. However, this laziness has produced most of our monotonous built environment, which is in contrast to the biologically derived formal language to which we are naturally accustomed and in which we find beauty.

Recent developments in software and production methods allow us to return to a complex and diverse design language. Orchestrating a built environment with naturally formed esthetics is achieved when resources are used efficiently and their material properties harmonize with the forces within the structure and the laws of nature.

We call this way of working "processual casting." Methods and boundary conditions are defined and esthetics are not planned, but merely anticipated as they emerge from the activity of the process. The final figure is a snapshot of the forces at play in shaping the fluid enclosed by the flexible formwork; a new ornament, shaped by gravity and the pressure of the fluid. It bulges outwards where the material is compressed and wrinkles where it is pulled. This book is intended as a source of inspiration and invites designers to further develop these low-cost methods. It provides a stage for the broad spectrum of freeforms and introduces alternative methods for orchestrating and shaping cast forms, such as inflatable formworks made of thin films, elastic fabrics. Formwork which is dissolvable, such as ice or biodegradable 3D-printed material or sand which gets washed away. Forms, which also serve as reinforcement, disappear into the mold and become invisible when shaped by a magnetic field.

Experiments in the garage, with my kindergarten buddy August Kocherscheidt, kicked off the production of a series of cast objects. As "Graulicht" we molded textures, fiddled with recipes, mixed colors and played with formwork resulting in commissions, art installations, and public-sculptural furniture.

Our interest was focused on the process more than the final product. Often an idea with a quick sketch was enough to start experimenting. The laughs about hands-on failures is Graulicht's driving factor.

With Quirin Krumbholz, Adam Orlinski, Moritz Heimrath, and Klaus Bollinger a research grant from the FWF at the University of Applied Arts Vienna set a stage for "Fluid Bodies." Machine power, engineers, and helping hands all joined the cellar club, enabling the development of the methods described in this book with a series of workshops, installations, and finally this publication.

CORE TEAM:

Graulicht, August Kocherscheidt and Rupert Zallmann MADAME Architects, Quirin Krumbholz, Rupert Zallmann Bollinger+Grohmann, Adam Orlinski, Moritz Heimrath

TEAM:

Anna Banicevic, Jean Pierre Bolívar, Paul Clousier, Anton Defant, Marco Dessi, Ruthi Gassauer-Fleissner, Anna Heimrath, Catherine Hu, Mato Johannik, Jakob Kainz, Ursula Klein, Ivo de Nooijer, Giulio Polita, Daniel Prost, Philipp Reinsberg, Franz Sam, Thomas Schönbichler, Michael Tingen, Lucas Zallmann

Concrete Canvas, William Crawford and Phill Greer

University of Applied Arts Vienna, Klaus Bollinger, Studio Stefan Diez, Studio Greg Lynn

École nationale supérieure d'architecture de Versailles, Studio Klaas de Rycke





A snapshot of the forces at play; a new ornament, shaped by gravity and the pressure of the fluid.

TWO FROM ONE CAST

August Kocherscheidt and Rupert Zallmann in Conversation with Luca Conte

The young Viennese design studio Graulicht has set itself the task of removing concrete from its familiar urban context and letting it appear in a new light in a private setting. A conversation with Rupert Zallmann and August Kocherscheidt about sandbox rampages and flak towers in the living room.

Why did you choose concrete as the primary material for your designs?

- AK We have always been fascinated by the esthetics of monoliths, flak towers, or grain silos. That's why we set out to take the property of concrete out of its urban context and transfer it to user interfaces.
- RZ It's actually the secondary material that allowed the primary material to be what we were playing with as formwork. We just had to make sure the liquid didn't spill until it cured. We were interested in textures and transferring forces to thin slabs and refined surfaces.

Studio Graulicht was founded by the two of you in 2001. How did the collaboration between an architecture student and an industrial design student come about?

- RZ It all started in kindergarten, where we had our first fight in the sandbox. Eighteen years later, we sat together late at night and decided we had to replace the wobbly evening table at August's house. Fortyeight hours later, a table was cast. That summer, six more "case study tables" were created, designed in our swimming trunks and cast in the garage.
- AK Our common access to the University of Applied Arts Vienna accelerated this development and created further projects.

Are you still fighting?

RZ Sometimes...



The wine table is a topographic surface that curves inwards and provides space for bottles.

WINE TABLE

→ digital design → mill the shape from wood → vacuum-pull the PVC film over the shape → weld the reinforcement → build the support structure → turn over and pour concrete

Graulicht (Rupert Zallmann – August Kocherscheidt) : 2009



 $\boldsymbol{\uparrow}\,$ The first series of experimental cast objects from the year 2000.

How do you deal with the prejudice that concrete looks clunky and heavy?

- RZ We play with this prejudice and try to achieve exactly the opposite by defining new applications. It can be a source of light or heat and make the living space more practical and playful through built-in functions. Its versatility and durability are remarkable and ultimately it has the potential to be more than just a visually appealing surface.
- AK What other material is so weather resistant?

How did you come up with the idea of integrating concrete into living spaces?

AK We want to move away from viewing concrete as a mere construction-site material towards an essential material of personal, everyday life. Conscious mastery of the surface is our concern.

Are there any role models for your work process?

- RZ Certainly the works of Le Corbusier, who deliberately used different formwork structures, or Tadao Ando, who paid great attention to perfection in execution, have a great influence on us. But on the scale we operate, we have not looked to similar projects for guidance, so we would describe our process of experimentation as inductive. We approached concrete specialists and structural engineers with specific questions.
- AK When asked about feasibility, especially when it came to the span and thickness of a table top, we often got the answer: "unfeasible." So we didn't stick to standards and converted our garage into a laboratory to work out our own method.
- **RZ** We made our first break with the standard with the "Prix-Tisch," which spans two meters with a thickness of three centimeters instead of the eight required by the standard.

Wolf dPrix once said to you: "The architect does what he means and then the material does what it means." To what extent do you manage to bring this material into the desired form or can it not be tricked?

- RZ Not tricked, but tamed. Especially the physical properties. Concrete has its own character because certain factors cannot be influenced. Concrete is liquid at the beginning. It goes through a metamorphosis at the end of which, with a little help, it slips out of its formwork as a table.
- AK The result is always unique. Concrete ages, it acquires a patina. Over time, fine hairline cracks can appear and color differences can develop. The result is always unique and lets you feel time as it ages with you.

Who do your pieces appeal to?

AK We see our furniture in contrast to standardized consumer and throwaway culture. Although we make concrete look delicate, it remains heavy and solid. In a sense, our monoliths are objects for eternity. Those who are aware of this and see certain furniture not as furnishings but as part of the room's architecture, welcome us.

What will the future bring?

- AK We are currently working on modular systems that convey the lightness of concrete and can be extended into infinity.
- RZ We will continue to fight in and with concrete, breaking new ground. We have by no means reached our, and its, limits.



← 2002: August Kocherscheidt and Rupert Zallmann installing the "Prix-Tisch."





↑ 2022:

Wolf dPrix celebrates two centuries with his concrete table. Cast in one piece, the table spans 200cm with a thickness of only 2cm and has not been maintained or treated since the day it was cast.

HF WELDING—A LOVE STORY

Ursula Klein – University of Applied Arts Vienna, Industrial Design







↑ Ursula Klein in her workshop Photos: Nike Eisenhart

The technology of high-frequency welding triggers a kind of romantic interaction between molecules. Like the arrow of Eros, electrical energy arouses the molecules in the foils in bright excitement. They begin to rub against each other, generating heat that softens the material. With the pressure of the welding tool, the heated molecules are united forever.

The shape of the welding tool determines the shape of the seam. It can be made of steel, brass, or aluminium. Unlike other technologies for plastic processing, the tools for HF welding can be quite simple and are not necessarily expensive.

This method is very useful for all kinds of model-making and prototyping in the field of industrial design. The necessary skills are easy to learn and are an integral part of our studio at the University of Applied Arts Vienna.

For welding inflatable products such as water wings, beach toys, all kinds of inflatable animals, or urban installations like *Restless Sphere* (1971) from COOP HIMMELB(L)AU, cut the foils into the desired shape—don't forget to weld the valve!—and use the welding tools to join the foils.







↑ COOP HIMMELB(L)AU: *Restless Sphere*, Basel, Switzerland (1971) Photos: Katharina Vonow Whether it is a simple pillow or a more complicated object, the production of inflatable objects must be very precise. Inaccuracies lead to leaks and leaks are very unpleasant in inflatable objects.

By replacing air with concrete, Fluid Bodies have pushed the limits of this technique. A stronger film, welded with more energy, finally gave the seam enough strength. Failure to make good, precise, strong seams had disastrous consequences. As the foils burst and liquid flowed out with very high pressure, everyone within reach had to push against the bursting structure to stop the bleeding as the substance inside finally went from liquid to solid.





↑ Testing welding patterns



↓ Testing pigments
← Testing reinforcement
→ Testing foil thickness

