EcoMould™

Forward-looking **model & formmaking**
for **circular construction**

ParaStruct
We enable Circular Solutions

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ParaStruct

We develop innovative technologies that enable significant resource savings and higher profit margins in various industries. Our interdisciplinary team combines materials science, civil engineering and technical chemistry with digital manufacturing processes. We develop customized, sustainable solutions that offer your company a decisive competitive edge

In making the circular economy possible, we transform unused waste streams into valuable resources that make expensive raw materials superfluous. **EcoMould**, our pioneering, circular technology platform for modelling & formwork, is revolutionizing the construction & design industry with its economic performance and ecological added value. We show you how EcoMould helps you to overcome growing challenges in surface and component production profitably and quickly, so that you can set yourself apart from the competition, sustainably.

✉ **Let's discuss together how EcoMould can make your production future-proof** and increase your value proposition!

Construction in flux

The construction industry faces complex challenges. Meeting ecological requirements while at the same time responding to declining order volumes, rising costs for materials and energy, combined with reduced purchasing power. Due to the increasing shortage of skilled workers and the need to make the most of efficiency potential, the industry is increasingly turning to the prefabrication of components.

Prefabricated components are typically standardized and often lack astonishing surfaces. **Mould production is complex**, **is a time-consuming process** and quite **cost-intensive**, particularly for skilled labour, transport, energy and operating materials. On top of that, formworks are used once or for small quantities and then disposed of, which leads to unnecessary and costly waste streams. Formwork skins are conventionally made of technical wood-based materials, plastic panels and XPS, which mainly end up in incineration.

In addition to the loss of valuable raw materials and the associated costs for purchasing new ones all the time, the construction industry is confronted with changing demands and new expectations from important customer groups. Stricter regulatory requirements, detailed building product declarations and the obligation to disclose CO_2 emissions are increasing the pressure on companies to stand their ground against the competition.

The ongoing trend towards healthy and safe living is increasing the **demand for regional, harmless and low-carbon building materials,** while the greater demand for transparency is driving the circular economy, not least to ensure more reliable supply chains. Efficiency gains through prefabrication, element construction, modular or serial construction and renovation are leading to stronger efforts for introducing innovative solutions profitably.

Minimizing the use of raw materials, energy and transport routes is key to meeting current market requirements. The smart and effective design of manufacturing processes and the associated costs, as well as the advancing digitalization and automation, set sustainable companies apart from the competition. This applies to building construction and architectural design, gardening and landscaping as well as to craftmanship. High-quality surfaces, functional concrete furniture for indoor and outdoor areas, as well as outstanding design objects enrich our built environment. However, the market clearly demands innovative, more sustainable solutions, at competitive prices.

Challenges for construction industry

- Declining order volumes and decreasing purchasing power
- Intense competition at regional and international level
- Increasing shortage of skilled workers and high labour costs
- Rising energy and commodity prices
- Supply chain transparency & resilience
- Growing quality demands from customers and end users

Potentials & trends

- Decarbonization & increasing reuse of building materials
- Proactive innovation and early adaptation of new technologies to increase efficiency & automation
- Replacing raw materials with secondary resources
- Innovating beyond compliance
- New business models in a circular economy

EcoMould = competitive circularity

ParaStruct's **EcoMould** provides a circular, cost-effective and efficient solution to manufacturing complex shapes. The customized material mix is precisely adapted to the specific requirements of your production and guarantees optimum performance. Resulting components offer a wide range of tensile strengths and specific densities, enabling you to meet even the most demanding customer requirements. After multiple use, the moulds are completely recycled and the initial materials are fed directly into the next production run - without any loss of quality. Waste costs become profits.

Production time	Density	Compressive strength	Flexural tensile strength	Cost / Form
minutes - hours *(depending on building room utilization)*	**0,25-3** kg/dm³	**2-30** MPa	**1,5-8**MPa	**€-€€** *(depending on #, model, materials)*

Our **3D printing process, specially optimized for industrial requirements**, maximizes efficiency and design freedom. Using "Selective Binder Activation", particle material mixed with binder is applied in layers and only solidified where the resulting component requires it. Remaining particle material serves as support structure and is extracted after completion so that it can be directly reused in subsequent jobs. A single to several objects are produced within the building space in a single process step. Thanks to the reliable process, there is no need to change tools and the amount of work is minimized, which significantly reduces wear and costs.

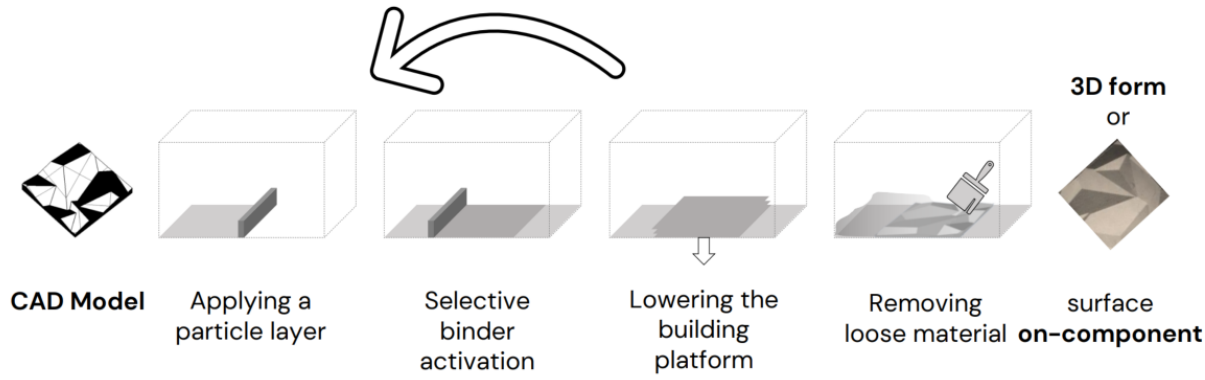


Illustration: Schematic visualization of 3D printing process, "Selective Binder Activation"

Any geometrical shape can be produced based on a CAD model. Moulds **up to 10m² in size are possible** and **up to 1.5m³/h** of particle material can be processed. Thus, EcoMould is even **more cost-effective than milling** moulds, aside of using waste materials. **Set-up times and downtimes are minimised**. On top, EcoMould **can also be applied on-component**, adding value to prefabricated products.

Digital manufacturing also achieves **greatly reduced development times** and you can react even faster to customer requirements. Topology optimization and demoulding simulations are generated quickly with 3D printing and can be tested and made available immediately. The unlimited design freedom enables even **more efficient mould production**, additional **energy and material savings** and **rapid adaptation of designs** in the product development process.

In addition to **free-form moulds** and **components,** areas of application include custom-made products and surfaces, innovative solutions in furniture and interior design, including direct use in cold casting like façade panels from fibre-cement or gypsum. The outcompeting **production costs are approx. 8€/dm³** of printed particle material.

The grain size and the selected material determine the density and surface quality of the mould. **The smaller the grain size, the finer the immediate surface finish**. In this way, high-quality moulds polished to a high gloss can be produced, as well as more lightweight porous material, in order to provide the desired specifications in an even more cost-effective manner.

According to your customers preferences, even higher surface quality can be achieved by subsequent milling, grinding or additional coating. Known post-processing methods are easily possible. Surface hardness of Shore A 80-100 is possible, depending on the particle material used and optional coating. The coefficient of thermal expansion is very low and lies between 1-2 * 10^{-6} K^{-1}, making EcoMould suitable for various shaping processes. EcoMould is **form-stable and exhibits very low warpage and shrinkage.** In addition to its flexible application and good machinability, EcoMould can also be repaired quickly and easily. This **enables rapid intervention, further cost savings** and **ensures maximum production capacity utilisation**.

Major advantages include **considerable time saved** and **person-hours freed up**. Production time per object and associated costs are significantly reduced. EcoMould offers **significant lower** (~50%) **manufacturing costs** (approx. 8€/dm³) **than other modelling processes**, in 3D printing as well as traditional manufacturing and machining processes such as CNC milling. Instead of waste generating cutting processes, the purely mineral particle material in EcoMould is directly reuseable - avoiding hazardous waste and realizing circular advantages profitably.

ParaStruct offers an **innovative answer to increasing expectations and requirements** of customers for more sustainability and industrial transformation. EcoMould's circular advantage **reduces *global warming potential* with each subsequent run**, **minimizing logistic costs** and **transportation emissions**. Companies **save up to 90% of raw material consumption**, can produce more through freed-up machine capacities and **sustainably improve profitability**. On top, your in-house waste fractions can be checked for usability and in most cases the material cycle can be closed. You can pass these cost benefits on to your customers, **strengthening your market position and your value proposition**.

EcoMould enables **rapid tooling, prototyping and production at lowest cost. Take advantage of the cost leadership** (8€/dm³) **and improved CO_2 balance** for your products and stand out from the global competition. ParaStruct advises, supports and develops custom-fit solutions for your specific production processes and your customers need. Together, we make a valuable contribution to the sustainable development of our companies. We appreciate your interest and are looking forward to talk opportunities with you and your team.

✉ Get in touch with a suitable date suggestion!

EcoMould™

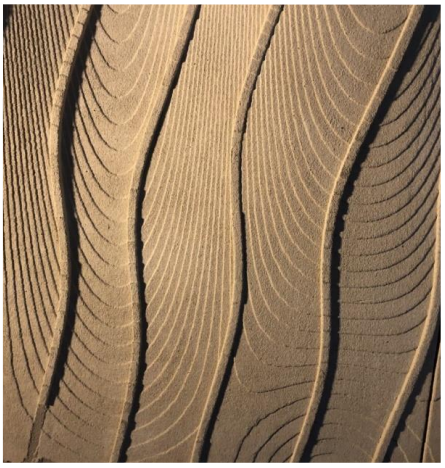
faster

sustainable

advantageous





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