



monoplan

One Material One Product

Supermarket of the Future

A project by  
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Universität der Künste Berlin 2022  
Design and Social Context  
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How can we cut down single-use packaging for cleaning products?

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# Intro

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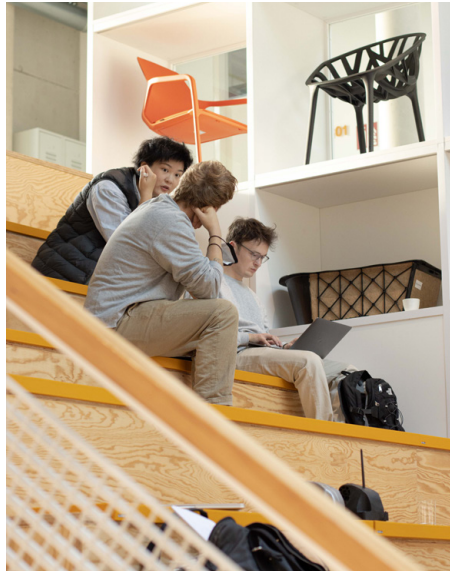
This booklet documents a proposal that, as a hybrid, combines the briefings of two design projects: *Supermarket of the Future* and *One Material One Product*. In the former „We develop new sustainable designs, packaging, concepts and strategies for the supermarket (food, liquids, objects) and make those work in daily life (no niche areas) aiming for a high impact“ which was combined with the Frame of One Material One Product: „Nowadays many end products are made from a combination of different plastic groups. This often improves the performance of the goods, but makes recycling difficult or impossible. Which products, that are now made of different materials, can be made from one material or... can you come up with alternatives and new product typologies from one material?“

The project kicked off with a field trip to BASF's headquarter in Ludwigshafen/DE. Over the course of two days, we were introduced to the company's brand and portfolio, gained practical knowledge about plastics and plastics processing, and finally developed and pitched an initial design.

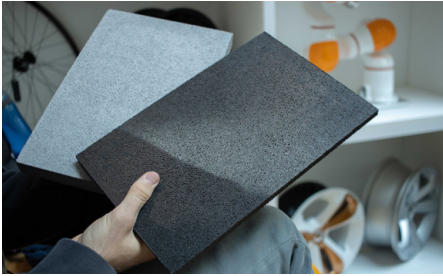




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# Research

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My research started with a painpoint-mapping on the topic of supermarkets and food distribution. I quickly encountered the issue of single-use packaging and deposit systems, literally like an elephant in the room.



**Coca-Cola**  
ZERO SUGAR  
UNZUCKERTE SÜßIGKEIT

**deit**  
Citra

**deit**  
WASSER

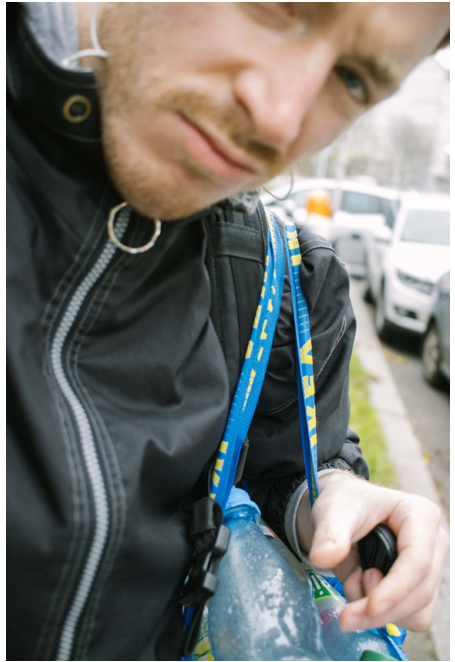
**LIEBERT**  
WASSER

**deit**  
Zitrussyde

**Leichte Schokolade**

**Wohlbehagen**  
natürlich



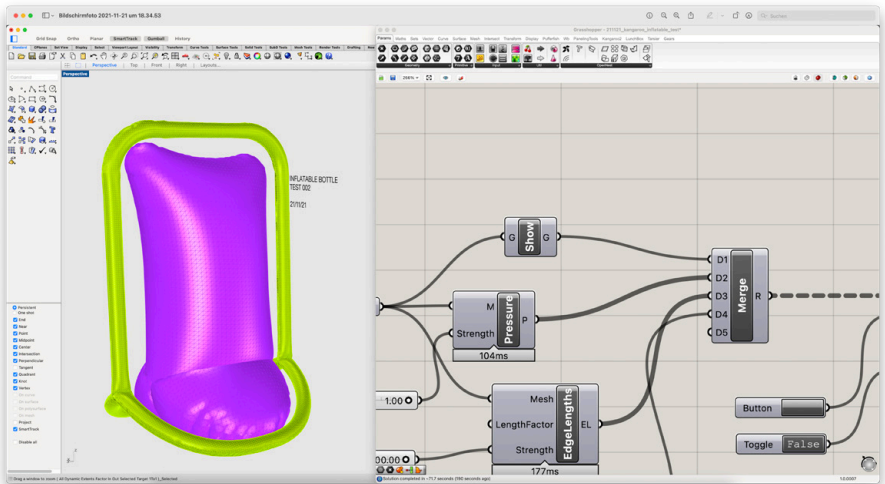


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In further fieldtrips I looked into the handling of our deposit system and came up with my first concept: a reusable packaging that can collapse after use and thus takes up less space during both storage and transport.

After deeper research, however, this milieu turned out to be extremely rigid, as the established, widely used deposit systems, such as that of the standardized 1L reusable bottle, are subject to various restrictions.





# The future is unpackaged!

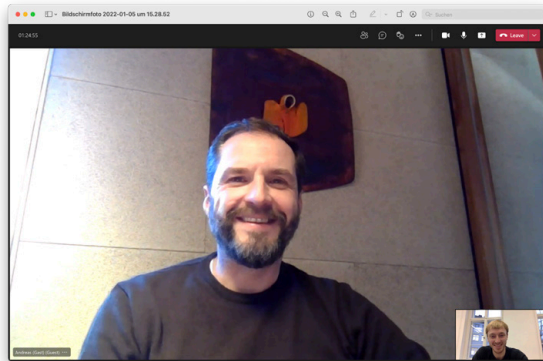
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In parallel, however, I became aware of another topic during a visit to an zero waste store, namely the bulk containers in which goods can be offered without packaging. The delivery of unpackaged food has long since moved from a niche topic to one that is now making wide spread into our supermarkets. Whether it's pulses, pasta or fresh vegetables, all these products can be conveniently filled into their own packaging in order to save on single-use packaging. However, it is more difficult with liquid products such as detergents and cleaning agents.

The most common products here are those from Sonett, which come in standard 10L & 20L canisters and are filled via standardized spouts. Sonett produces ecological detergents & cleaning products of various kinds and considers itself a Cradle-2-Cradle company. With their own recycling circuit for filling canisters, Sonett is leading a pilot project and exploring the possibilities of ecologically responsible consumption. Having my curiosity freshly awakened, I took this as an opportunity to ask about it in more detail. Fortunately, I got a direct contact to one of the CEOs and asked him for an interview.



# Interview with Andreas Roth CEO at Sonett 05.01.2022



## A) Fragen zum Sonett-Recyclingkreislauf

*1. Laut einer Pressemitteilung vom 02/2021 können 80 % der Kanister wiedergefüllt werden, der Rest wird als geshreddertes Recyclat neu produzierten Flaschen zugemischt. Wie ist der aktuelle Stand und die Bilanz des Projekts; hat sich der Projektrahmen ausgeweitet?*

Projekt geht weiter, es gibt jetzt Sammelboxen für Läden  
Filialisten (Denns, Alnatura, Bio Company)

*2. In derselben Pressemitteilung schreiben Sie, dass die Einsparung an CO<sub>2</sub>e der 10-/20-Liter-Kanister zwischen 63–68 % liegt. Berücksichtigt wurde neben Transportkarton und Reinigung auch der Rücktransport. Können Sie diesbezüglich genauer sagen, wie viel Emission der Rücktransport verhältnismäßig ausmacht? ca. 15% innerhalb DACH, durchschnitt 442km Wegstrecke*

*3. Welche Rolle spielt dabei das Volumen der leeren Kanister?*

Volumen spielt signifikante Rolle, LKW Auslastung 12% der Gewichtskapazität  
Rücktransport: 1. Direktkunden bekommen Paket mit Lieferung, in selbem Paket geht es wieder zurück

Großhändler: ab 1 EUR Palette: Abholung wird veranlasst

Großhändler mit eigenem Fuhrpark nehmen Pfandbehälter mit, sammeln, liefern  
leergut Kanister bei Warenabholung wieder ab

*4. Ist das Rückführungssystem neben Unverpacktläden auch für den allgemeinen LEH vorgesehen? Falls ja, wie ist der aktuelle Stand, wie hoch ist die Bereitschaft des LEH?*

- ungeheuer aufwändig: Hürde vom Gesetzgeber: Kunde muss tatsächliche Menge bekommebfillstationen einfacher Art (Plastikpumpen 30/100ml Hub)

5. In der erwähnten Pressemitteilung schreiben Sie auch, dass die Entwicklung des Systems von der Organisation mit den Handelspartner\*innen abhängt. Wie ist hier die aktuelle Stimmung und welche Faktoren erschweren die Implementierung? Welche Pain-Points bestehen bei der Abstimmung mit Unverpacktläden/LEH?

6. Haben Sie Daten/Berichte über die Kund\*innen-Zufriedenheit mit dem Sonett-Kanistern bzw. auch dem Abfüllen über Pumpe/Hahn?

Leute sind genervt von den Pumpen (die kommen aus England), gehen öfter mal kaputt

user-experience eher schlecht

7. Sind bei Sonett neben den bestehenden Kanistern auch andere Behälter in Betracht gezogen worden (Bag-in-Box, eigene Kanister, etc.)?

Kanister haben food approval (HDPE), sind monomaterial, stabil, etc.

B) Fragen zur Reinigung und Wiederaufbereitung von Sonett-Kanistern

1. Wie Handhaben Sie bei Sonett die Reinigung, haben Sie eigene Anlagen entwickelt oder übernimmt die Reinigung ein externer Dienstleister?

eigene in-house Reinigungsstruktur, Sonett will alle Schritte in Haus haben, volle Verantwortung

2. Gab es bereits einen standardisierten Prozess zur Reinigung von Kanistern?

Anlage ist größtenteils standardisiert, besondere Anforderung an Waschdüsen wegen Schaumbildung

bevor Kanister gewaschen wird, wird Restflüssigkeit ausgesaugt

Anlage kostet 120.000€, trocknet Kanister auch innen, desinfiziert mit UV Licht  
3-4 Kubikmeter Wasser

muss geschlossenes System sein, um kein Wasser ins Wassersystem zu geben

3. Wie hoch sind die Ansprüche an Reinheit bei Reinigungsmittel-Containern im Vergleich z.B. zu Lebensmittelbehältern?

chemische Desinfektion wie z.B. bei Flaschen keine Möglichkeit

Anlagen für chemische Desinfektion benötigen Explosionsschutz, Anlage wird 50x so teuer

In the conversation with Andreas, valuable information could be discussed both on the conception of a cycle product and, for example, technical details of valves. He also pointed out to me the critical point of cleaning, which is a considerable cost factor in the Sonett cycle, and indicated that the current return transport of the canisters has an efficiency of the trucks of just under 10%. With all good intentions, a lot of potential for improvement is revealed here, which forms the transition to my design scenario.

# Scenario



Today's supermarkets surround us with an enormous variety of products.



Accordingly, many single-use packages contribute their share to our short-sighted plastic consumption and ultimately to the climate crisis.





The concept of unpackaged food retail and the use of reusable packaging are sustainable approaches to the problem.



And establish itself besides zero waste shops also in our supermarkets.



However, liquids such as detergents and cleaning agents still pose a packaging issue.



Current refill approaches are barely user friendly.



And recirculation systems with bulk canisters that are returned and refilled are not very efficient.



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What if these bulk containers could compress like this



and be used like this?

# Concept

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## monoplan

a circular packaging concept for cleaning products

monoplan introduces a new take on refill stations for liquid detergents or hygiene products. In contrary to established canisters, the reusable bulk bag deflates while dispensing, therefore enabling both a minimal residue and return volume, ensuring sustainability. It is designed to be refilled in a cradle-2-cradle cycle and eliminates the exhaustive process of internal cleaning before refilling, as no environmental air enters the container during bottling. Once worn out, the bag can be materially recycled due to its mono-material fabrication.

To enhance user experience, the dispenser is designed to be used intuitively and guarantees a spill free bottling process, regardless of content.



**score**  
**Organic Detergent**

score Organic Detergent is made from natural, renewable and highly effective ingredients, ensuring your dishes are clean and safe. It is a powerful cleanser that is gentle on your hands and the environment.

**Usage:** 100ml per 2.5kg load

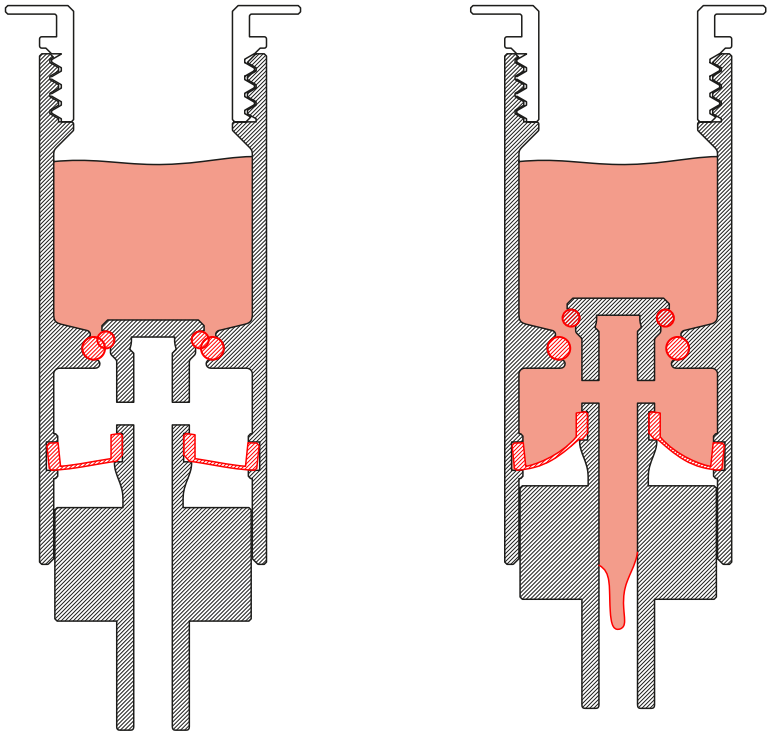
**Ingredients:** 100% Biobased, 100% Biodegradable, 100% Plant-based, 100% Free of Phosphates, 100% Free of Chlorine, 100% Free of Bleach, 100% Free of Sulfates, 100% Free of Parabens, 100% Free of Formaldehyde, 100% Free of Heavy Metals, 100% Free of Microplastics.

**Barcode:** 7011/100ml





To ensure convenient usability and meet the demands of a mono-material design, the dispenser, just as the bag and handle, uses the versatile properties of Elastollan®, serving a wide range of Shore hardnesses from very soft and flexible to hard and springy. It consists of a housing screwed to the bag, a movable trigger, a corresponding disk spring and two sealing rings.



To bottle liquids, the dispenser is held with one hand and compressed with counterpressure on the trigger using the vessel brought along. This raises the trigger and opens the valve so that liquid can flow past the seal. The TPU disk spring acts as an elastic living hinge and closes the valve again as soon as pressure is released. To work with different viscosities, the flow openings of the trigger can be varied. This enables a homogeneous flow and non-residual, drip-free filling.



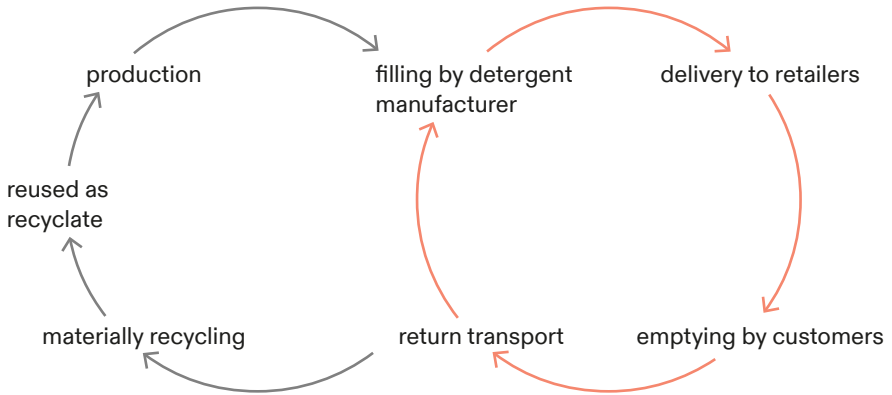
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Each monoplan has its own ID and thus enables the use in a closed circuit. Corresponding information is indexed with a QR code engraved to the top handle.



In order to reduce packaging material and to avoid contaminating the monoplan material with ink, the bags themselves are not branded with the product information. Instead, this information is on a permanent label attached to the hanger.

# Product Cycle



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Alongside usability, the focus of this product is on its use in a closed cradle-to-cradle cycle. After production, this consists of filling by the detergent manufacturer, decentralized delivery to retailers, residue-free emptying by customers, return transport to the filler, refilling under exclusion of air and finally resupply to retailers.

The key feature comprises the design of the volume: In contrast to conventional canisters, no air and thus no bacteria or germs from the environment enter the container during bottling. Instead, it deflates and thereby reduces its volume for storage and return transport to a minimum. On one hand, this increases the efficiency and thus also the eco-balance of the return transport by up to 90%\*. On the other hand, there is no need for the elaborate cleaning of the containers, as they are not contaminated and can be refilled with the same product due to unique IDs. For this purpose, monoplan is sent back including the dispenser, which seals it until it is used in the aseptic system. An undercut in the threaded hub allows automated handling there.

When monoplan has completed its life cycle, the mono-material design allows it to be materially recycled and reused as recycle in the production of new bags.

\*compared to conventional canister systems





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GETTY'S GALS

# Context & Impact

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monoplan proposes a new approach to the retailing of refill liquids and thus enters an area that has not yet seen any real design. It is important to emphasize that the use is not only intended in zero waste stores, but explicitly aims to spread also in supermarkets and thus in all our daily lives.

We already see how more and more supermarkets offer unpacked products, but in most cases these are only dry products. monoplan can contribute an important share in this movement by enabling the integration of liquid products such as detergents & cleaning agents without complex filling stations or storage & return problems.





10L e

ecore

10L e



monoplan

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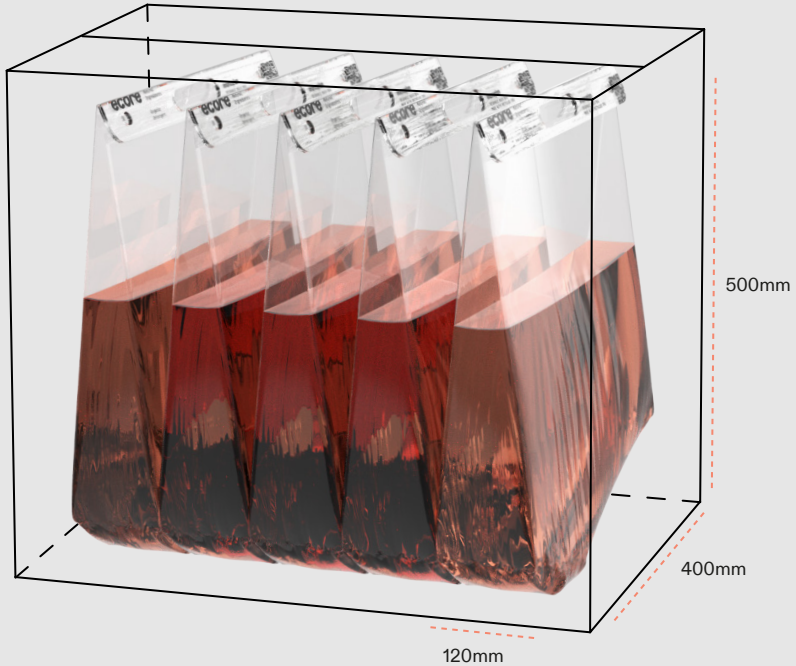
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# Handling

5x

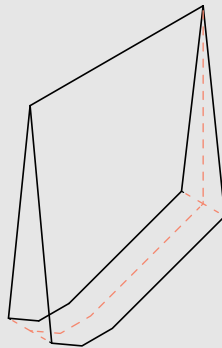
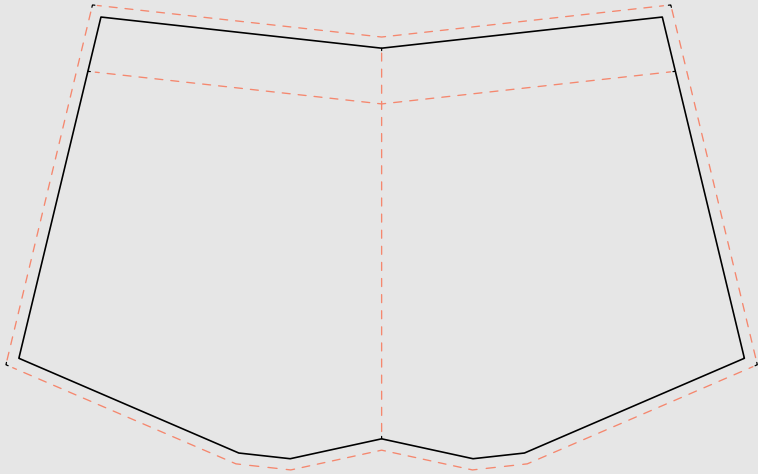
monoplan  
10L



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monoplan is designed to allow filled bags to be transported in units of five in shipping boxes or, in larger scales, additionally on Europallets. This facilitates handling and minimizes the weightload in the process.

# Manufacturing



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Monoplan is designed according to industrial production guidelines with the aim of low production costs and material consumption. The bag is made from a single die-cut Elastollan® film, causing minimal offcuts due to the optimized pattern.



Radio-sonic welds shape the volume and connect the top handle as well as the thread port. The information of the top handle is laser engraved and thus does not add any contaminant to the material.



The dispenser consists of multiple injection molded parts, both rigid and flexible TPU, and gets snapped together.

# Material

Nummer:	geprüft:	Elastollan® Standard-Ester (z.B. 500, 800)		Elastollan® C 85 A		Elastollan® Ether-Typen (z.B. 1100)	
		23 °C	60 °C	23 °C	60 °C	23 °C	60 °C
<b>11. Adhäsive</b>	Adhäsive	Wochen	Wochen	Monate	Wochen	Monate / Jahre	Monate
	Methanol	Tage		Wochen / Monate			Monate
<b>12. Alkohole</b>	Ethanol	Monate				Jahre	
	Isopropanol	Monate		Monate		Jahre	
	Pflichtlösung A	Monate		Jahre		Jahre	
	Pflichtlösung B	Tage		Monate		Jahre	
<b>13. FAM-Prüflösungen nach DIN 51604*</b>						starke Quellung	
<b>14. ASTM-Öle nach ASTM D 471-06**</b>							

Nummer:	geprüft:	Elastollan® Standard-Ester (z.B. 500, 800)		Elastollan® C 85 A		Elastollan® Ether-Typen (z.B. 1100)	
		23 °C	60 °C	23 °C	60 °C	23 °C	60 °C
	Bleichlösung, 0,5%ig	Monate		Wochen		Monate	Wochen
	Oberfläche wird klebrig						Jahre
	Oberfläche wird klebrig						Monate
<b>8. Reduzierende Lösungen</b>	Natriumsulfid, 3%ig	Monate / Jahre		Wochen / Monate		Jahre	Monate
	gesättigte Calciumhydroxid-Lösung (giclöchter Kalk)	Monate / Jahre		Wochen		Jahre	Monate
	3%ige Sodaaesung	Monate / Jahre		Wochen		Jahre	Monate
<b>9. Laugen</b>	3%ige Natronlauge (Natriumhydroxid)	Wochen	Tage	Monate	Wochen	Jahre	Monate
	3%ige Triethanolamin-Lösung	Monate	Wochen	Monate / Jahre	Monate	Jahre	Monate
	3%ige ...						
<b>10. Basische Lösungen</b>	3%ige ... Lösung						

Nummer:	geprüft:	Elastollan® Standard-Ester (z.B. 500, 800)		Elastollan® C 85 A		Elastollan® Ether-Typen (z.B. 1100)	
		23 °C	60 °C	23 °C	60 °C	23 °C	60 °C
<b>0. Wasser</b>	Leitungswasser	Jahre	Monate	Jahre	Monate	Jahre	Jahre
	Seewasser	Jahre	Monate	Jahre	Monate	Jahre	Jahre
	3%ige Essigsäure	Wochen	Tage	Wochen	Tage	Jahre	Monate
	3%ige Milchsäure	Wochen	Tage	Wochen	Tage	Jahre	Monate
<b>1. Schwache Säuren, Carbonsäuren</b>	3%ige Borsäure	Monate	Wochen	Monate / Jahre	Wochen / Monate	Jahre	Monate
	3%ige Phenol-Lösung	Wochen / Monate	Tage	Monate / Jahre	Wochen	Jahre	Monate
	Analog ist einzuschätzen die Wirkung von Ameisensäure, Propionsäure, Buttersäure, Laurinsäure, Ölsäure, Stearinsäure etc. jeweils in 3%iger wässriger Lösung.					Zufestigkeit über nur 30% wegen Quellung.	
<b>2. Komplexbildende Carbonsäuren</b>	3%ige Zirkonsäure	Monate	Tage	Monate	Tage	Jahre	Monate
<b>3. Schwache Mineralsäuren</b>	3%ige Natriumhydrogensulfatlösung	Monate	Tage / Wochen	Monate / Jahre	Wochen	Jahre	Monate
	3%ige Phosphorsäure	Monate	Tage	Monate	Wochen	Jahre	Monate
	3%ige Salzsäure	Tage	Stunden	Tage	Stunden	Jahre	Monate
<b>4. Starke Mineralsäuren</b>	Analog einzuschätzen ist 3%ige Schwefelsäure.						
<b>5. Batteriesäure</b>	Batteriesäure	Tage	Stunden	Tage	Stunden	Jahre	Monate
<b>6. Oxidierende Mineralsäuren</b>	3%ige Salpetersäure	Tage	Stunden	Tage	Stunden	Tage	Stunden

42

The concept utilizes the performance material Elastollan® from the BASF performance plastics portfolio. Advanced versions of the TPU provide the required resistance to acids, alkalis and essential oils. As already mentioned, all elements of the monoplan assembly are made of TPU, so both the bag and the valve can be materially recycled thanks to key innovations from BASF.

**TPU**

low shore hardness  
(+/- 87A)



**TPU**

high shore hardness  
(+/- 80D)



**TPU**

low shore hardness  
(+/- 70A)



# Process

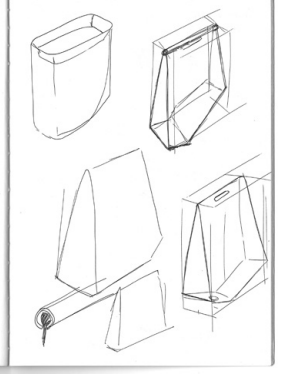
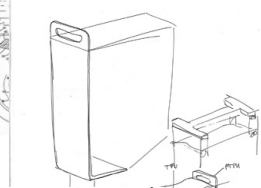
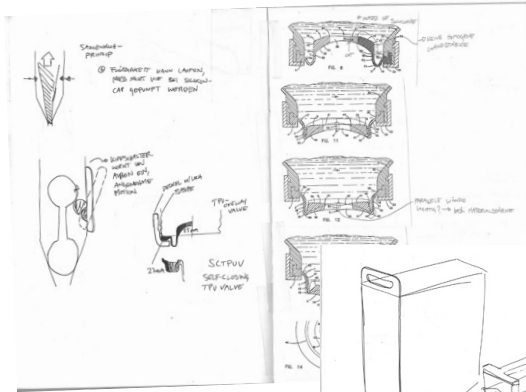
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In an interplay of formal iterations and material- as well as usability-related research, from sketches to paper mockups to functional mechanisms printed in FDM and SLA, prototypes were created and eventually field-tested.

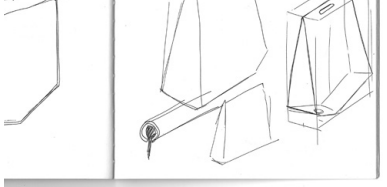
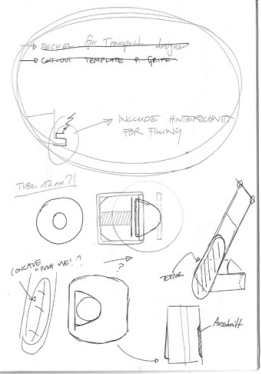
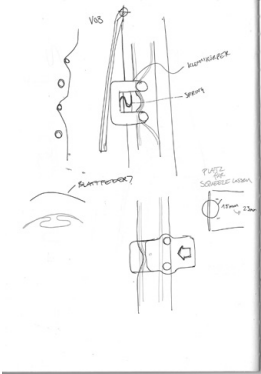




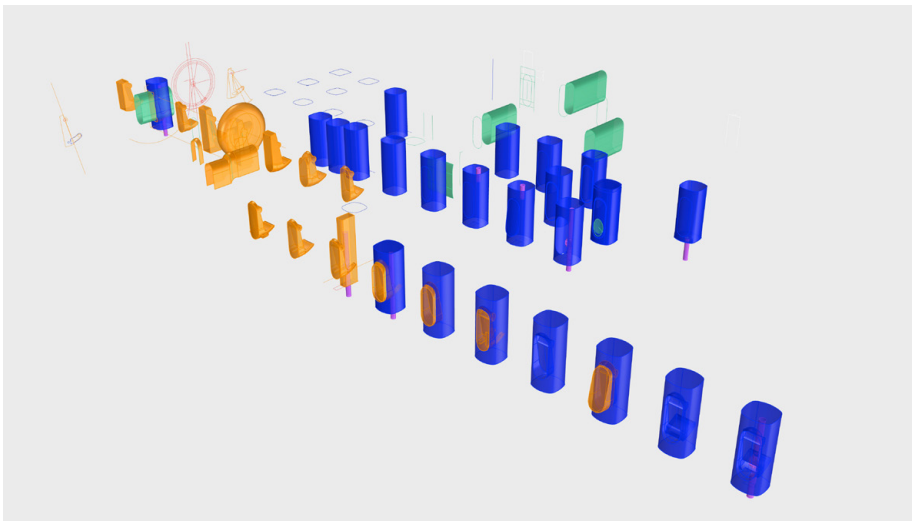
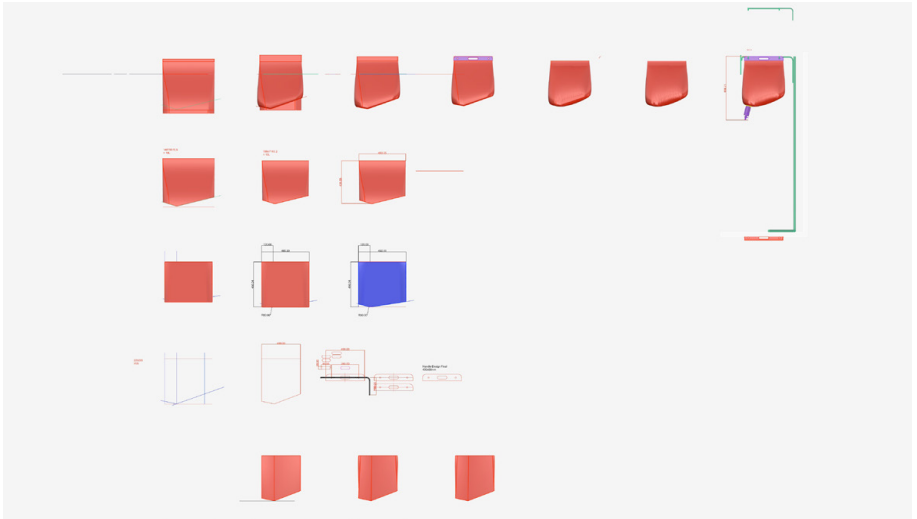
# Iterations



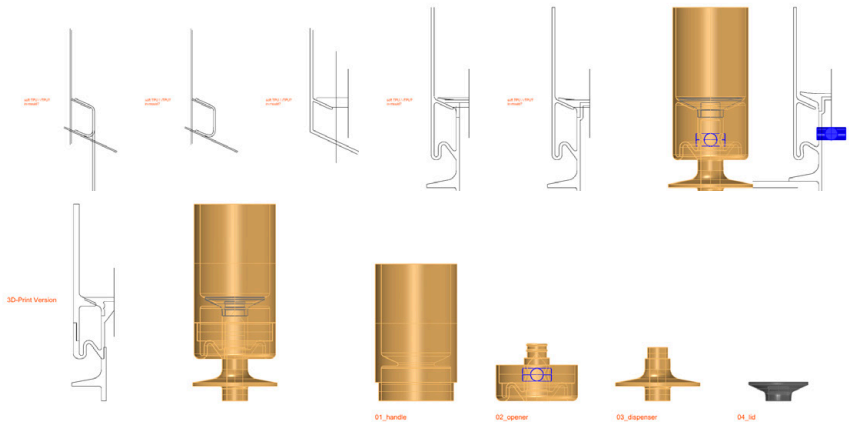
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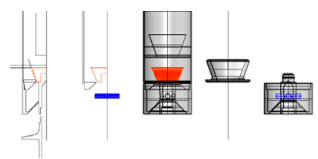
# CAD-Development



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V00

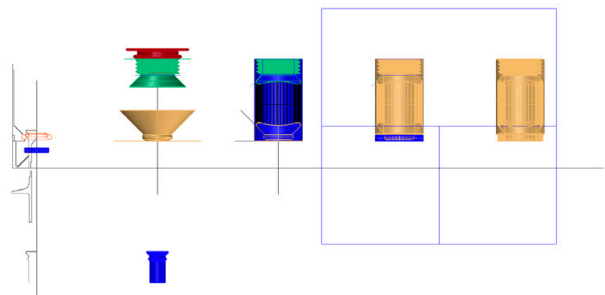


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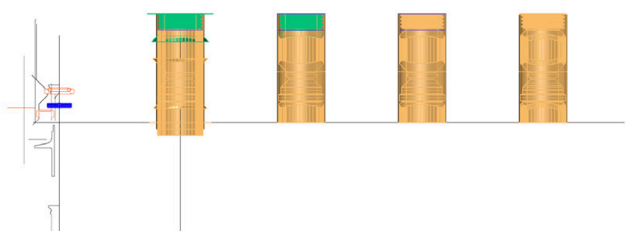


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220213  
V04



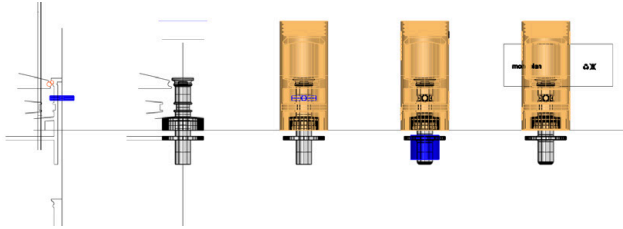
220217  
V05  
(injection  
moulding)



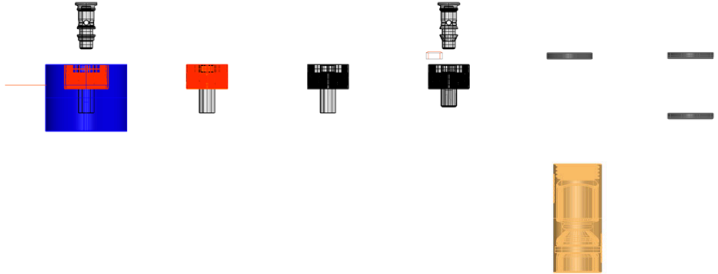
220217  
V06  
(injection  
moulding)



220217  
V07  
(injection  
moulding)



220219  
V08  
(fdm print)



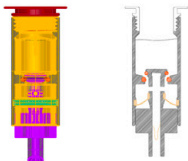
220219  
V09  
(fdm print)



220220  
injection  
mould  
render



render  
assembly



render  
exploded

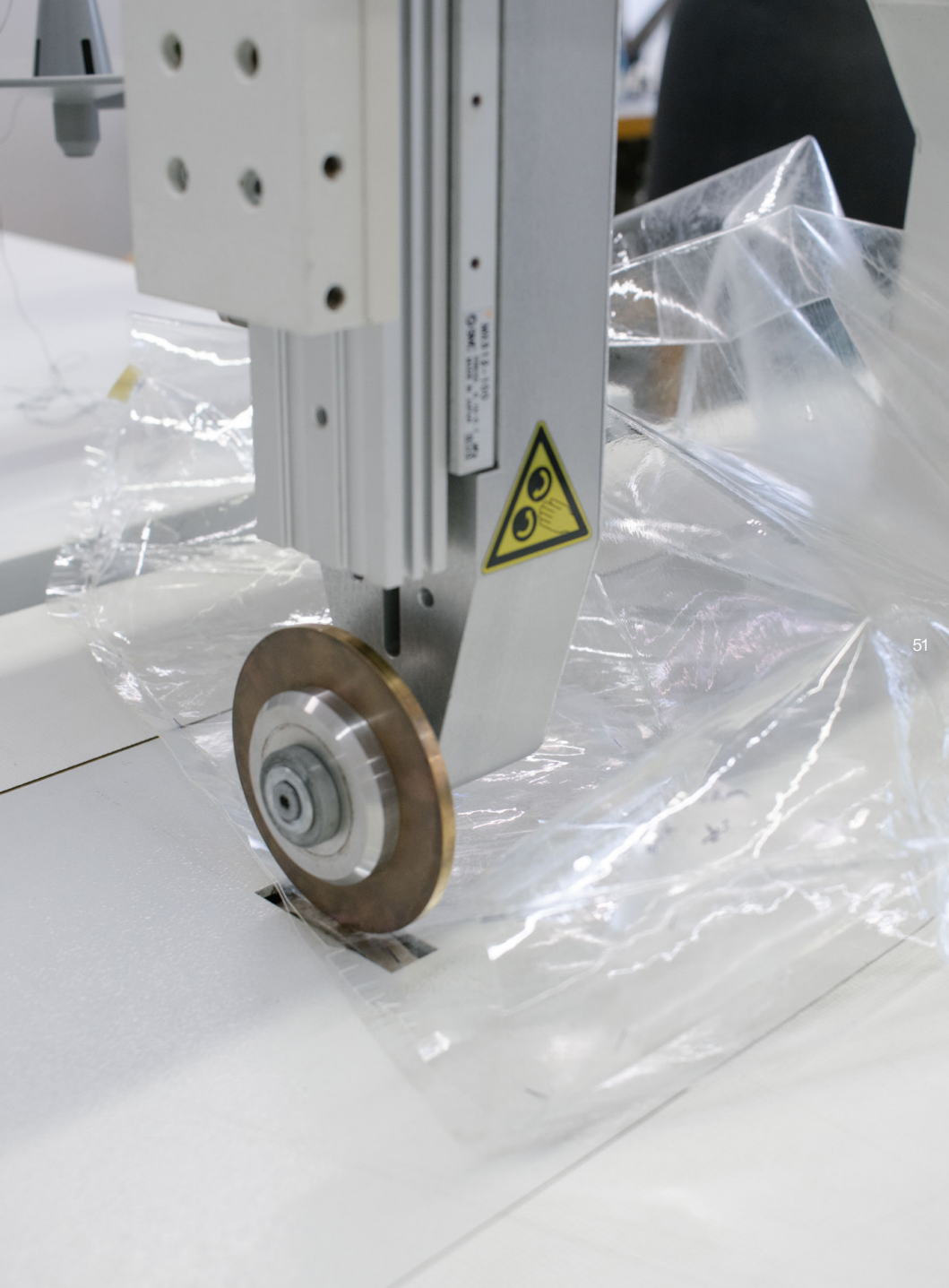


# Prototyping



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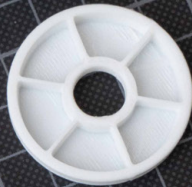
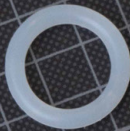
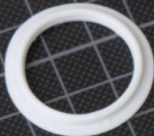
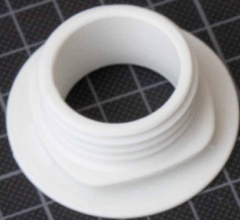




WELLS & WELLS  
ONE WAY  
1000



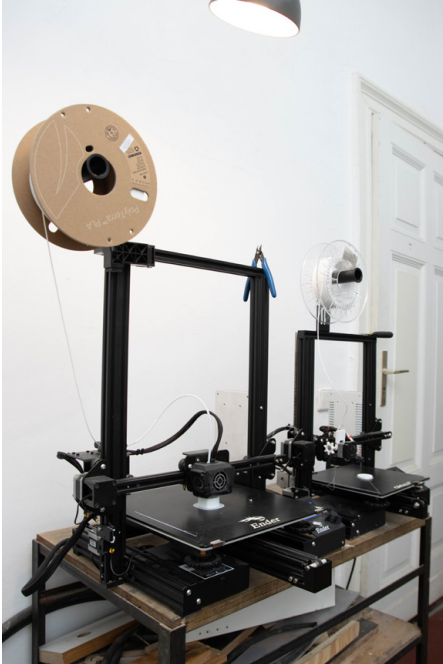




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26 27 28 29







do an ultrasonic welding project they said,  
it will be fun they said



A project by  
Tim Schuetze

Universität der Künste Berlin 2022  
Design and Social Context  
Prof. Ineke Hans, KM Maciej Chmara