

CRADLE TO CRADLE® DESIGN INNOVATIONS

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Abstract: *The Cradle to Cradle® concept defines and develops the reuse of products. Compared to traditional recycling, it maintains the same level of quality of raw materials through the life cycles of several products, and only safe chemicals are used. Products are developed in accordance with the principle of maintaining the quality of raw materials over several life cycles, even if we take into account the use, production processes and reuse. This means: no waste, since all ingredients are treated as nutrients for the next cycle. The right materials are included in certain cycles (metabolism) at the right time and in the right place. The approach of a circular economy analyzes the recycling economy in the value chain, which leads to the generation of revenue from recycled materials. Cradle to Cradle® defines quality preservation as well as the cost-effectiveness of the value-added chain. Re-use materials from Cradle to Cradle® products allow the cost of materials to be as close as possible to the cost of materials. Even if additional costs arise due to processing or cleaning, they are still lower than the market price of the material. The Cradle to Cradle® model transposes the principle "quality is equal to quantity" to industrial systems. The flow of materials is designed to be useful and useful for the restoration and conservation of biological and technical resources. This approach stems from the tendency to slow down and reduce the negative impacts on the environment. Breakthrough projects and innovations of Woford, DyStar, Napapijri, Sanko and Calida will be presented.*

Keywords: *Cradle to Cradle, sustainable development, innovations, certification*

INTRODUCTION

Cradle to Cradle Design opens the perspective of an industrial society where processes of production and use are designed by transfer of principles of Nature. Nature knows material flows, but Nature does not know waste, avoidance, constriction and restriction [1]. Nature is simply involving right materials at the right place and at the right time. In the case of textiles treated with chemicals innovation is needed to develop only chemicals which are safe for biological cycles.

In regard to differentiation to conventional recycling the quality level of the raw materials remains throughout multiple product lifecycles and only purely "assessed safe chemicals" are used.

The products are developed according the model to maintain the quality of raw materials over multiple life cycles taking the production processes, the use and the reutilization into account [2]. This means: No waste, all ingredients are considered as nutrients. The right materials are integrated in defined cycles (metabolism) at the right time and place.

The 3 Cradle to Cradle® Design Principles:

- Waste = Food
- Energy: use of renewable resources
- Diversity

Nature as a model reflects ongoing developments in a Cradle to Cradle® product: Flourishing trees in spring are only apparently redundant. From a few blossoms new trees are growing. All blossoms not used for growth, fall to the ground and become nutrients.

Cradle to Cradle® Products reach a new quality dimension and distinguish themselves through high economic value as well as modest, ideally with no environmental damage [3]. They achieve high consumer friendliness and are credentials of a paradigm change towards consumer behavior and in the industrial production. Cradle to Cradle® Design defines not only form, functionality and ingredients of a product. The goal is to strive for a new dimension in quality and safety in endless cycles.

Cradle to Cradle® Design transmits the principle “Quality equal Quantity” to industrial systems. Materials together with material flows are designed to be beneficial and useful for the regeneration and conservation of biological and technical resources. This approach liberates from the present obligation to diminish, reduce or slow down the need to negative environmental impacts [4].

BREAKTHROUGH INNOVATIONS IN TEXTILE INDUSTRY

Wolford

Austrian textile company Wolford is located in Bregenz in Austria and in Murska Sobota in Slovenia. It's opening a new story in direction of circular economy. That's breakthrough on textile and clothing area. After five years of team working in cooperation of 15 companies they made it to certify a biological cycle decomposition over industrial composting as technical cycle through the decomposition of textiles. Both certification are in performance on GOLD Level Cradle to Cradle Certified™ and appearance is luxurious.



Figure 1: Certification line of premium textile Wolford

DyStar

The DyStar Group is a leading dyestuff & chemical manufacturer and solution provider, offering customers across the globe a broad portfolio of colorants, specialty chemicals, and services. With a heritage of more than a century in product development and innovation for the textile industry, DyStar also caters to multiple sectors including the paints, coatings, paper and packaging industries. Its expansion into the food & beverages and personal care sectors reinforces the company's position as a specialty chemical manufacturer. DyStar's global presence offers customers reliable access to experts from offices, competence centers, agencies and production plants spanning over 50 countries.

The assessed Dystar Textile Dyes have achieved a Material Health Certificate on the Gold level. They include VAT Dyes, Reactive Dyes, Disperse Dyes, Indigo Dyes and a Reactive Dye for wool. The DyStar Group has offices, competence centers, agencies and production plants in over 50 countries to ensure the availability of expertise in all important markets. With a heritage of more than a century of product development and innovation for the textile and leather industry, DyStar has developed into new markets and now in addition serves the paper, plastic and many other specialty chemical industries.

Approved for use: 39 dyes are available and the full collection is displayed in the table below.

Table 1:

#	VAT Dyes	Reactive Dyes	Disperse Dyes	Reactive Dye for wool
1	Indanthren® Brilliant Orange GR Coll	Levafix® Amber CA-N	Dianix® Blue XF	Realan Black MF-PV
2	Indanthren® Red FBB Coll	Levafix® Brilliant Yellow CA	Dianix® Yellow AM-SLR 200%	
3	Indanthren® Brilliant Green FFB Coll	Levafix® ECO Forest	Dianix® Yellow S-3G	
4	Indanthren® Olive Green B Coll	Levafix® ECO Black	Dianix® Yellow Brown XF2	
5	Indanthren® Scarlet GG Coll	Levafix® Fast Red CA	Dianix® Yellow XF2	
6		Remazol® Brilliant Blue RN	Dianix® Orange AM-SLR	
7		Remazol® Brilliant Red F3B	Dianix® Turquoise S-BG	
8		Remazol® Brilliant Yellow GL 150%	Dianix® Blue S-BG	
9		Remazol® Yellow GR 133%	Dianix® Brilliant Violet R	
10		Remazol® Luminous Yellow FL 150%	Dianix® Red AM-SLR	
11		Remazol® Golden Yellow RGB	Dianix® Red XF2	
12		Remazol® MAP Black NN	Dianix® Rubin XF2	
13		Remazol® Navy RGB 150 %	Dianix® ECO Black HF	
14		Remazol® Red RGB		
15		Remazol® Ultra Carmine RGB		
16		Remazol® Ultra Orange RGB		
17		Remazol® Ultra Orange RGBN		
18		Remazol® Ultra Rubine RGB		
19		Remazol® Ultra Navy Blue RGB		



Figure 3: Certificate Cradle to Cradle Certified® issued for Sanko Textile

Calida

CALIDA looked to nature for inspiration when it designed its "I love nature" collection.

At CALIDA have more than 75 years of experience designing and manufacturing underwear – and they want to get even better. Their aim is to offer underwear suitable for every day, every taste and every situation. And top priority is always durability, quality and attention to detail – from design and fit, developing the best materials, through to the workmanship of the final product.

With the I LOVE NATURE range, CALIDA has created a true innovation in the field of sustainability; soft against the skin, temperature-regulating, fast-drying and odour-minimising



Figure 4: Calida "I love nature"

CONCLUSION

The Cradle to Cradle® concept improves the economy in the entire value cycle of a product. Related risks within the supply chain and the production achieve higher transparency. The cost of the economy, the environment and the social aspects become predictable and profitable.

All substances and materials along the entire supply chain are being considered from raw materials to products within the Cradle to Cradle® Design Concept. This results in a product of unmatched quality. Therefore, a continuous raw material use is practice without restrictions.

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