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New Mono-Material Flexible Pouch Follows Cradle to Cradle Principles

Werner & Mertz partners with Mondi, three others to close the loop on package design

By Robert Grace

Albin Kälin wants to close the loop. For more than 25 years, the Swiss native has steadfastly encouraged the creation of products that adhere to so-called Cradle to Cradle® principles. These principles provide the basis for a global system for developing and certifying sustainable economic feasibility. He continues to urge that transformation today, with the aim of achieving a more circular economy.

The Cradle to Cradle (or C2C) concept has been around since the early 1990s, but many companies still do not fully understand it, much less practice it. A recent plastics packaging development in Europe, though, provides an excellent model for others interested in proceeding down the C2C path.

After almost four years of development, Vienna, Austria-based packaging and paper producer Mondi Group enlisted the support of several partners—to include Kälin's own EPEA Switzerland GmbH—to develop a fully recyclable, all-polyethylene, stand-up pouch for a German maker of cleaning products. Created to hold Frosch-brand detergent from Werner & Mertz GmbH, this patented, mono-material pouch features detachable decorative panels and—through painstaking planning and research—overcomes many shortcomings of the recycling process.

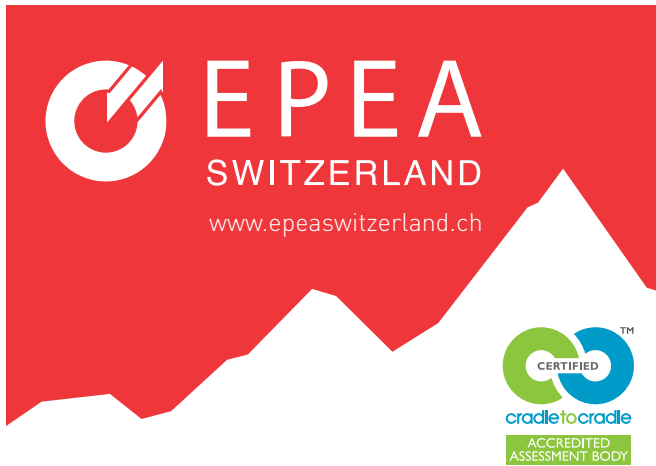
Werner & Mertz plans in 2019 to introduce this pouch, which will replace conventional flexible packaging for its Frosch-brand products. The design resulted from an intensive joint effort by five partners. In addition to brand owner Werner & Mertz and packaging supplier Mondi, the team included:

- EPEA Switzerland GmbH, whose role in the project was to assess—down to the molecular level—which materials (to include all the resins, inks and



EPEA Switzerland's Albin Kälin: "One company cannot do this alone anymore We have to remake everything that we make today."

Courtesy of EPEA Switzerland GmbH



constituent components) were environmentally acceptable and suitably recyclable for the desired end product.

- Institut cyclos-HTP, the Institute for Recyclability and Product Responsibility, which strove to ensure that those materials would work within existing recycling structures and throughout their extended lifecycle.
- And finally, Der Grüne Punkt—Duales System Deutschland, which researched and confirmed the potential market value of the resulting recycled materials.

The C2C design approach dates back a quarter century and has its roots in the collaborative work of American architect William McDonough and German chemist Dr. Michael Braungart. In 1992, the two published “The Hannover Principles: Design for Sustainability.” And a decade later, they published “Cradle to Cradle: Remaking the Way We Make Things.” They describe the C2C process as “encapsulating a journey of discovery about materials as biological or technical nutrients and their use periods and their evolution.” They jointly then created a framework for quality assessment and innovation called the Cradle to Cradle Certified™ Products Program.

The C2C concept is circular in nature and, Kälin notes, requires a whole new approach to product design. In it, he says, waste materials in an old product become the “food” for a new product. The aim is to use materials over and over again instead of downcycling them into lesser products. This contrasts with the more linear Cradle to Grave approach to product lifecycles, which still results waste at the end of the cycle.

The Cradle to Cradle term is now a registered trademark of the Charlottesville, Va.-based McDonough Braungart Design Chemistry consultancy (www.mbdc.com). MBDC previously handled C2C product certification as a proprietary service, but in 2010 licensed to an independent nonprofit called the Cradle to Cradle Products Innovation Institute, or C2CPII (www.c2ccertified.org). The institute

says it aims to be an agent of change through open-source information.

Once a product is designed and developed along C2CC guidelines, it still needs to be vetted and C2C certified by C2CPII through an accredited organization such as EPEA Switzerland.

In the Cradle to Cradle model, all materials used in industrial or commercial processes are grouped into one



The new Frosch detergent pouch features detachable, printed panels on both front and back to help enable recycling. Courtesy of Werner & Mertz GmbH



of two categories—"biological" or "technical" nutrients:

- "Biological nutrients" are organic materials that, once used, can be disposed of in any natural environment and decompose into the soil, providing food for small life forms without affecting the natural environment.
- "Technical nutrients" are strictly limited to non-toxic, non-harmful synthetic materials that have no negative effects on the environment. They can be used in continuous cycles as the same product without losing their integrity or quality.

Kälin—who was managing director of Switzerland's Rohner Textil AG from 1981 to 2004—served as CEO of Hamburg-based EPEA Internationale Umweltforschung GmbH from 2005–2009, when he left that role to found EPEA Switzerland. (EPEA, he notes, stands "Environmental Protection Encouragement Agency," and his firm is one of just 15 worldwide accredited as general assessors for the Cradle to Cradle Certified™ certification.)

Kälin says the process employed by Werner & Mertz and its partners for developing the new Frosch pouch was "fairly radical." It involved "learning by doing and has never been done in this way." He goes so far as to describe it as "a lighthouse for all industries for how new products can be created."

Family-run Werner & Mertz—which was founded in 1867 in Mainz, Germany—says it was told by a number of packaging suppliers that what it wanted to do on the Frosch pouch was not achievable. Then, in 2014, it approached Mondi, which said it was up for the challenge.

"The project was truly ambitious," the brand owner says. "It was not about developing flexible plastic packaging that is only theoretically recyclable—packaging likely to end up in landfill. Rather, the design aim was to 'reverse-engineer' the recycling process, to create packaging fit for every stage of the recycling process."

A crucial and often neglected step in the recycling process is sorting, explains Immo Sander, head of packaging development for the Werner & Mertz Group. Failure to sort the collected packaging into material streams that recyclers can use leads to downcycling—that is, the production of recycled material no longer suitable for its original application.

"If you want to avoid a 'garbage in, garbage out' scenario," Sander notes, "the entire value chain must be aligned—from packaging producers through players in sorting and recycling, to buyers of recycled material."

Institut cyclos-HTP, according to co-managing director Joachim Christiani, offered early suggestions on package design, appropriate materials to use, and the availability



W&M's Immo Sander: "The entire value chain must be aligned—from packaging producers through players in sorting and recycling, to buyers of recycled material."

Courtesy of Werner & Mertz GmbH



W&M CEO Reinhard Schneider demonstrates how easily the glue- and adhesive-free printed panels peel away from the pouch itself.

Courtesy of Werner & Mertz GmbH

of sorting and recycling facilities in Europe.

Dr. Markus Helftewes, managing director for Der Grüne Punkt, meanwhile, praises the strong cooperation between all five of the project's partners, suggesting it provides "a good example of the progress that can be made" toward closing the circle and reducing product waste.

"Everyone," Sander stresses, "must depart from the status quo and accept that risk is a necessary condition for serious technological advancement. If you want to develop something new, you have to be willing to put in hard work, to take the hurdles of 'restrictive thinking'."

Developing a viable pouch for easy recycling meant it needed to be a mono-material construction, while not sacrificing end-use performance.

"Our collaboration with Werner & Mertz shows, in the best possible way, how challenges can become solutions," says Jens Kösters, manager of technical services for Mondi Consumer Goods Packaging. "We worked our way through an 'innovation funnel'—testing different materials until we arrived at a designed-for-recycling concept that convinced everyone at each point of the value chain. Furthermore, the concept offers clear benefits related to sealing strength and maximum filling volume."

The development partners finally needed to resolve the issue of recycling printed plastic materials. The pouch



Illustration courtesy of Mondi Group & Werner & Mertz GmbH



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has two low-density polyethylene layers, including detachable decorative panels.

“We dress the pouch up in an eye-catching ‘outer garment’ that is printed with brand design on the front and consumer info on the back,” says Sander. “When the pouch is empty, we ‘undress’ it automatically by shredding and sorting the two components into separate recycling streams.”

About 85 percent of the package’s LDPE material, including the spout and cap, is unprinted, meaning the transparent material can be recycled while retaining its original performance properties. The balance of the material is still fully recyclable, since the package uses no glues or adhesives.

Additionally, for user convenience, the patented pouch features a die-cut handle.

The resulting flexible pouch also uses 70 percent less material than its rigid bottle counterpart. (Werner & Mertz CEO Reinhard Schneider discusses the development in this brief video: bit.ly/Mondi_Frosch_pouch. He calls this new innovation with Mondi “a promising start to a new partnership.”)

For his part, Kälin notes that most organizations struggle to effectively implement the Cradle to Cradle concept. “Very few companies ‘get it’ the way Werner & Mertz and Mondi did,” he says, adding that he hopes the project inspires other companies in the plastics, packaging and beyond to undertake similar journeys.

“One company cannot do this alone anymore,” he adds. “You need an innovative design and a network of experts to create products for a circular economy. We have to remake everything that we make today.”



Cradle to Cradle® Projects Reference Model

1. Define purpose of the product
2. Determine the metabolism: biological or technical
3. Define closing-loop scenarios
4. Define areas of innovation (chances/risks)
5. Develop the product criteria and product purposes
6. Set the priorities of the criteria
7. ABC-X categorization of the ingredients
8. Develop the positive list
9. Phase out plan X (red) substances
10. Implement the product design
11. Implement the production and supply chain processes
12. Strategically implement the closing-the-loop scenario
13. Develop the marketing statement (certification yes/no)
14. Influence consumer behaviors
15. Financial investments
16. Decide on marketing focus
17. After-sales service following the product launch

Featured at ANTEC 2019

Albin Kälin will be one of the featured speakers at SPE’s upcoming ANTEC 2019 international technical conference (www.4spe.org/antec) in Detroit this spring. He’ll be part of the event’s newly created Insights sessions on the last day and a half of the March 18 to 21 conference.

Watch for additional details about the presenters and sessions for that portion of the program, which will focus on packaging, sustainability, transportation, building and construction, additive manufacturing, and emerging materials technologies such as graphene and nanotechnology.

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ABOUT THE AUTHOR

Robert Grace is a writer, editor and marketing communications professional who has been active in B2B journalism since 1980. He was founding editor of and worked for 25 years at *Plastics News*, serving as editorial director, associate publisher and conference director. He was managing editor of *Plastics Engineering* from July 2016 through October 2017, and now is both editor of SPE’s *Journal of Blow Molding* and directing content strategy for SPE. He runs his own firm, RC Grace LLC, in Daytona Beach, Fla., and can be contacted at bob@rcgrace.com.

