Cradle to Cradle® - Parquet for Generations Respect for Resources and Preservation for Future

Reinhold Herkströter1 Albin Kälin2 Marko Krajner2
1 Bauwerk Parkett AG, Neudorfstrasse 49, CH-9430 St. Margrethen
2 EPEA Switzerland GmbH, Seestrasse 119, CH-8806 Bäch
Speaker:
Marko Krajner, EPEA Switzerland GmbH

krajner@epeaswitzerland.com www.epeaswitzerland.com

Abstract: Working with wood means assuming a responsibility. Wood is the most important naturally re-growing raw material and it is considered to be the construction material of the future. However, treated with chemicals (adhesives, lacquers) the resource wood becomes waste. Having adopted a new technology under the name of “Silente”, Bauwerk Parquet, based in Switzerland, is breaking new grounds. Silente products follow the Cradle to Cradle® design principle. Cradle to Cradle® stands for a closed raw material cycle and a respective quality assurance process. Bauwerk parquet is designed to last for generations. It should never become a waste product or consume unnecessary or environmentally harmful energy. Raw materials are preserved and the resource water is treated with consideration. Bauwerk acts in a fair and socially responsible manner, both within the company and in public. EPEA Switzerland is assisting Bauwerk in its implementation of the Cradle to Cradle® vision. Raw materials and ingredients from up to 36 suppliers are assessed on material health, reutilization, environmental impact and traced back to their origins. The “Silente” Bauwerk Parquet products are Cradle to Cradle Certified™ at GOLD level. Bauwerk floors that incorporate the new Silente technology can easily be dismantled and returned to the company. Thanks to the new “Silente-Mat”, the parquet can be taken up without being destroyed. All components can be either reconditioned or recycled for new products. Bauwerk products that incorporate the Silente technology are made exclusively from materials that are safe for both humans and the environment. Thanks to this closed cycle, Bauwerk conserves the valuable resource wood and acts in the interest of future generations.

- The use of healthy, non-hazardous materials
- The subsequent use of all materials in a closed cycle
- The validation of renewable energy
- Environmentally compatible water management
- Social responsibility

Key-Words: Parquet, Wood, Cradle to Cradle, Circular Economy, Innovation, Generations

1 Introduction

Wood is the most important naturally re-growing raw material and it is considered to be the construction material of the future. However, treated with chemicals (adhesives, lacquers) the resource wood becomes waste.

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. Nature is simply involving right materials at the right place and at the right time.

In the case of wood treated with chemicals innovation is needed to develop only chemicals which are safe for biological cycles.

1.1 Cradle to Cradle® Design

The Idea - Cradle to Cradle® Design defines and develops cycle able products.

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.

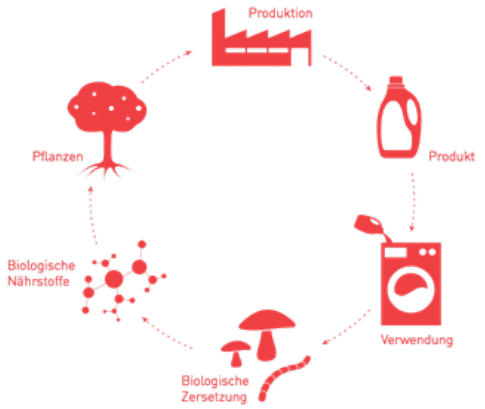
The products are developed according the model to maintain the quality of raw materials over multiple life cycles taking the production processes, the use and the reutilization into account. This means: No waste, all ingredients are considered as nutrients. The right materials are integrated in defined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

The 3 Cradle to Cradle® Design Principles:

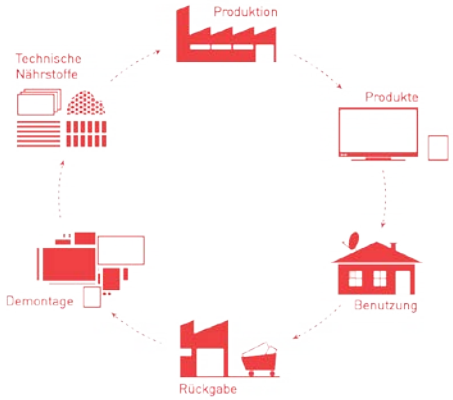
- Waste = Food
- Energy: use of renewable resources
- Diversity

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. 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.



Consumer Goods (natural fibers, cosmetics, detergents, etc.) are designed so that they can be used in biological cycles over and over again. They decompose to organic nutrients and promote biological nutrients and systems such as plant growth. The renewable raw materials are in turn the basis for new products.



Service Products (TV sets, cars, synthetic fibers, etc.), the so-called technical nutrients, are separated to enable the production of new commodities after fulfilling their initial function. The users / consumers purchase only the relevant services, e.g. Television. The materials remain the property of the manufacturer, which retains them through collection and reenters them into the technical cycle.

1.2 Differentiation: Quality equal Quantity

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.

2 "Silente" Bauwerk Parquet

Working with wood means assuming a responsibility. Wood is the most important naturally re-growing raw material and it is considered to be the construction material of the future. Depletion and illegal deforestation eliminate this basis for future generations. For the wood industry, it is fundamental to take responsibility for sustainable forestry which is fundamental and vital from an ecological standpoint. Purchasing raw wood from sustainable sources (e.g. FSC, PEFC certified) has been very important to Bauwerk for years. Bauwerk has guaranteed the use of innovative solvent-free industrial lacquers and adhesives, the extensive practice of recycling throughout the production process, the most advanced techniques aimed at lowering harmful emission and a high level of safety for its employees and the environment through its ISO 14001 safety certification.
The implementation of strict regulations when purchasing raw wood and commercial products is an important part of the company's approach. All Bauwerk parquet comes from sustainable forestry.

Having adopted a new technology under the name of "Silente", Bauwerk is breaking new ground. Silente products follow the Cradle to Cradle® design principle. Cradle to Cradle® stands for a closed raw material cycle and a respective quality assurance process.

2.1 Bauwerk-Boen Group

Founded in 1944, Bauwerk Parkett AG is the leading Swiss parquet manufacturer and the leading European supplier of two-layer parquet. The roots of Boen go far back into the 17th century when two sawmills near the Norwegian city of Kristiansand laid the foundation for today's leading supplier of 3-layer parquet. By the merger of the two companies in June 2013 the new Bauwerk Boen AG becomes one of the world's leading high end parquet manufacturer and Europe's No. 2. The Group employs approx. 1700 employees and produces over 9 Million m2 per year. The whole range of different parquets is offered by the two brands Bauwerk and Boen and is distributed through different sales channels in over 50 countries worldwide. The key markets are Switzerland, Germany, Austria and Scandinavia. Bauwerk Boen operates factories in Lithuania and Switzerland.

2.2 EPEA Switzerland GmbH

EPEA Switzerland GmbH supports companies in different areas of activities in the development and implementation of Cradle to Cradle ® design concepts.
With an experienced, internationally oriented and interdisciplinary working management team, Cradle to Cradle ® projects are implemented in all industries in the Alpine region (mainly Switzerland and Austria) – and in the textile industry worldwide. Scientific reviews for all projects are created in close cooperation with EPEA Internationale Umweltforschung GmbH.

EPEA Switzerland is an accredited general assessor for the Cradle to Cradle Certification™.

2.3 Parquet for generations

Bauwerk parquet is designed to last. It should never become a waste product or consume unnecessary or environmentally harmful energy. Raw materials are preserved and the resource water is treated with consideration. Bauwerk acts in a fair and socially responsible manner, both within the company and in public. EPEA Switzerland is assisting Bauwerk in its implementation of the Cradle to Cradle® vision and as general assessor for the Cradle to Cradle Certified™ certification.
Raw materials and ingredients from up to 42 suppliers are assessed on material health, reutilization, environmental impact and traced back to their origin. During the certification process for Bauwerk's new silente technology, both the suppliers and Bauwerk's manufacturing facilities were subjected to close scrutiny.

Bauwerk floors that incorporate the new silente technology can easily be dismantled and returned to the company. Thanks to the new "Silente-Matte", the parquet can be taken up without any effort. All components can be either reconditioned or recycled for new products.
Bauwerk products that incorporate the silente technology are made exclusively from materials that

are safe for both humans and the environment. Thanks to this closed cycle, Bauwerk conserves the valuable resource wood and acts in the interest of future generations.

2.3.1 The Cradle to Cradle Certified™ gold award for silente products confirms

• The use of healthy, non-hazardous materials
• The subsequent use of all materials in a closed cycle
• The validation of renewable energy
• Environmentally compatible water management
• Social responsibility

Bauwerk Parkett is ISO 9001 + 14001 certified.

2.3.2 Innovation Story

Bauwerk parquet is glued always completely with the subfloor. This has the advantage that a connection is made to the entire floor structure which also prevents noise. Skilled workers are trained for a perfect installment of the wooden parquet.

2.3.3 Task and implementation

The dismantling of a glued floor after its useful life has many difficulties. On the one hand the work is noisy, dirty and tiring and, secondly, time-consuming and expensive. In addition, the floor is destroyed during removal and must be discarded. Due to the different material components, a recycling of the waste is not possible. The problematic expansion of the soil structure inspired to search for a suitable separation layer between Parquet belts and subsoil, which should bring a relief.
In addition, a growing interest on the customer side for solutions with regard to walking and impact sound emissions was perceptible. These trends led to the project launch in 2011. Together with the German manufacturer, WPT, a walking and impact noise reducing mat was developed. The mat should be to a high degree technically effective and environmentally friendly. This was achieved with the raw material consisting of 80% natural chalk and the linking polyurethane glue is also very environmental friendly. Above and below the mat feels like a natural felt. The surface is additionally provided with a grid of yarn as desired separation layer, on which the parquet should solve from subfloor during disassembly.
The mat was called "Silente mat" and the method has been patented by the manufacturer. It is produced exclusively for Bauwerk. The standard version is manufactured in rolls of 7.5x1m. Assembly is done by sticking the mat to the subfloor. On the mat every Bauwerk parquet can be glued.
Parallel to this development Bauwerk got into contact with the EPEA Switzerland, the company supports the implementation of Cradle to Cradle® and to obtain the certificate Cradle to Cradle Certified™. The Cradle to Cradle concept is the development of products for material health, their use, recovering and reuse, by maintaining its high value over its entire lifetime and multiple lifecycles. After some project discussions, the idea came up, to develop the parquet floor nondestructively. In this way, the floor can be used repeatedly in a closed loop and multiple product cycles.
Applying the tailored mat strip directly to the finished parquet and then to the floor, two innovative approaches could be combined in one product. On the one hand, the desired separation mat layer represents 80% non-destructive expansion and secondly the Silente system enables improvements in walking and impact sound emissions.
Parquet Cleverpark is available in the size 1250x100mm. The product was subjected to standard tests for walking and impact sound determination at the EMPA in Duebendorf scored in system design (building Glue MS 40 for bonding to the subfloor + Cleverpark Silente) with very good values.
A major project in Chur, Switzerland, where around 1,500 m² Cleverpark Silente were laid, represented the first Silente project and offered the possibility to check the building acoustic values of a qualified architectural acoustics expert. This confirmed the values indicated in the certificates. Clever Park Silente is the only system manufactured with demonstrable results for walking and impact sound.
In 2013 the scientific institute EPEA assessed the product for Cradle to Cradle Certified™ Silver certification and optimized the chemicals in 2015 for Gold level.
The company and the product have been evaluated in 5 main categories:
• Material Health
• Material reutilization
• Renewable Energy and Carbon Management

• Water Stewardship
• Social Fairness

3 Result

As a result, the Cleverpark Silente received in the categories material reutilization, Renewable Energy + Carbon Management, Water Stewardship, Social Fairness the Cradle to Cradle Certified™ gold level, for the criterion of material health silver status. The assessment of materials, chemicals > 100 ppm in regard to their environmental and health relevance criteria such as acute and chronic toxicity, irritation potential for eye and skin sensitization potential, mutagenicity, carcinogenicity, teratogenicity, reproductive toxicity, endocrine disrupting activity, biodegradability / persistence and aquatic toxicity. The raw materials for the floor were also tested for the level of organ halogens (chlorine, bromine, fluorine) and the content of toxic heavy metals **(e.g.** antimony, arsenic, lead, cadmium, nickel, mercury). The cost of the core team of five employees and external consulting was high, especially since all the component suppliers (tier 1: six suppliers) and their upstream suppliers had to disclose their entire product specific data (tier 2: 36 suppliers). The chemical components were assessed at EPEA Int. Umweltforschung in Hamburg.
The certificate has been awarded Silver in October 2013 a total of five systems Parquet (parquet plus new Silente mat).
In January 2015, the project Cradle to Cradle Certified ™ Gold started. Since only the area material health had silver status and all other areas were already on the Gold Level, the suppliers were asked for solutions to replace the "gold-critical" components due to optimized materials.
In active collaboration this could be achieved and, since June 2015, the Bauwerk assortments Clever Park and Multi-Park Silente got awarded with the Cradle to Cradle Certified ™ Gold certification. Bauwerk is the world's only company in wood parquet achieving gold level.

Healthy living of Bauwerk products is a pillar of the activities. All generated knowledge and results from the C2C® project will be transferred to the entire Bauwerk Swiss Parquet production. Since November 2015 the entire Bauwerk Parquet production in Switzerland is Cradle to Cradle Certified™ at Gold or Bronze level.

Bauwerk is convinced to have done a significant step forward. Within the company, the customers and the environment. In the future less valuable timber is required. Through the multiple use of the products an important contribution to sustainability is made.

4 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 practiced without restrictions.

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