介绍

把一次性产品变成传家宝，或者为一代人建造房屋！职业设计师不应服从于线性经济下的设计概要！

循环设计法则V1.0 (CDR) 由9 张卡片组成，包含了在可循环利用产品设计中必要的规则。卡片上的 * 链接表示直接关系。

在每张卡片的背面都描述了循环设计的具体步骤。记分卡以循环设计法则 (CDR) 为基础概述了产品的循环潜力。CDR 是新欧洲包豪斯倡议框架下的一个研究项目，其中的规则是从众多可以有效的、引入积极的系统变革的设计范式中筛选出来的。

Turn disposable products into an heirloom or build houses for just one generation! Practice professional disobedience against the design briefings of linear economy!

The Circular Design Rules V 1.0 (CDR) consist of a deck of 9 cards that feature a rule that is indispensable in the design of recyclable products. The → links on the cards indicate direct relationships.

On the backside of each card, concrete steps are described to support the design process of circular products. The score-card gives an overview of the circularity potential of products on the basis of CDR.

CDR is a research project in the frame-work of the New European Bauhaus Initia-tive. The rules have been selected from a comprehensive collection of design patterns, which could effectively introduce a positive system change.

Imprint

内容与设计负责/Responsible for content and design:
IDRV – Institute of Design Research Vienna, 2021
作者/Authors:
Harald Gründl, Ronja Ullrich
Design/Design: Celine Radloff
翻译/Translation:
Peter Blakeney, Christine Schöffler, Xia Nan, Ruoyan Wang, Dr. Liu Xin

ISBN: 978-3-9503352-7-9

鼎力支持/
With kind support of

Federal Ministry
Republic of Austria
Climate Action, Environment, Energy, Mobility, Innovation and Technology

vienna business agency

As a non-profit association, the **IDRV** makes an independent academic contribution to the emerging field of design research.
www.idrv.org

designaustria, knowledge center for design & interest association for designers in and from Austria since 1927.
www.designaustria.at

IDRV and designaustria are partners of the

#NewEuropeanBauhaus

We would like to thank Dr. Liu Xin, Xia Nan and Ruoyan Wang from LeNS China for making the translation of the CDR into Chinese possible.

→ 电子版本/Digital version
idrv.org/cdr

循环
设计法则

Circular Design Rules – Version 1.0 Product Design

herausgegeben von/published by

Institute of Design Research Vienna

designaustria

清華大學美術學院
Academy of Arts & Design, Tsinghua University

Ⓜ 产品材料 Product Materials

人类的活动和产品正在超过我们这个星球的生物质总量，从而使得我们的自然资源变得稀缺，而额外的排放导致自然系统变得不平衡。材料的正确使用是循环设计的先决条件。这意味着，一方面，从种植到生物降解，维持循环中的可再生和可持续的资源（生物循环）；另一方面，未来将从产品中回收并重复使用那些有限且不可再生的技术材料（技术循环），而不是不断地从我们的星球上提取有限的资源。人类活动所产生的材料积累就成为新产品生产的原材料。

因此，循环设计的一个主要目标是以生物材料回归自然的方式开发产品，同时最大程度地保留技术材料的价值。

以塑料为例，我们发现减少聚合物使用可以创造当地的循环经济，利用分布式的制造技术，用旧材料生产新产品。

Human activities and products are ex-ceeding the biomass of our planet, while natural resources become scarce and additional emissions cause an imbalance in natural systems.

The proper use of materials is a prerequi-site for Circular Design. This means, on the one hand, keeping renewable and sustain-able resources, from planting to biodegra-dation, in the loop (Biological Cycle); on the other, the use of limited and non-renewable technical materials, which in the future will be recovered from products and kept in use (Technical Cycle), instead of the continued extraction of limited resources from our planet. The accumulated inven-tory of human activities then serves as the source materials for the production of new products.

Hence, a main goal of Circular Design is to develop products in such a way that biological materials find their way back to nature, while the value of technical mate-rials is preserved to the greatest degree possible.

With plastics, for example, we see that a few less polymers make it possible to create a local circular economy, which employs decentralized manufacturing techniques to manufacture new products from old materials.

Ⓚ 产品部件 Product Components

模块化和产品组成部分的可分离性被证明是循环设计的关键原则。更换或延长产品部件的使用寿命确保了产品的长期使用， 还可以对产品进行推广和改进。

这也是从现有组件生产新产品（ 再制造 ）的第一步，从而降低了原材料的采购和生产成本。因此，需要在组件层面进行设计创新，以确保产品长期保持吸引力，能够适应技术发展，并重新集成到生产过程中。

本着循环设计精神，设计师的任务之一是构想将现有组件和未来组件进行多种组合的可能性，从而开发新的、开放的产品系统。

标准化组件和本地生产化的新技术有助于适应新的需求，甚至可能使用户成为协作设计师。

Modularity and the separability of products into their components prove to be key principles in Circular Design. The possibility to replace or extend parts of a product ensures the long-term use of products as it involves the repair and maintenance, but also extension and improvement of products.

This is also the first step in the production of new products from existing components (Re-Manufacturing). The procurement of raw materials and production costs are thereby reduced. Hence, design innovations are required on the level of components, which ensure that the products remain attractive for a long time, can be adapted to technical developments, and be reinte-grated into production processes.

In the spirit of Circular Design, a task is to imagine multiple combinations of the components on hand and also future ones, and thereby develop new and open product systems.

Standardized components along with new technologies for local production facilitate adaptation to new requirements or may even empower users into becoming co-designers.

Ⓢ 产品系统 Product Systems

产品必须有意识地嵌入系统中，以实现循环。产品服务系统的设计产生了新的消费模式和市场，既基于服务，又基于资源的节约。对于设计师来说，这需要具备一种超越产品设计的设计理念，并将其产品的整个生命周期。众多用户可以从新的产品服务系统中受益，而相应的商业模式为制造商提供了可靠的收入和客户忠诚度。

此外，当产品的所有权是服务提供商所有时，组件和材料重复使用的路径会大大缩短，因此服务提供商有责任使循环成为闭环。

当制造商及其合作伙伴可以将高品质产品、零部件或材料保持在一个循环系统中，那么即使较短的使用寿命也可以实现循环经济的目标。

Products must be consciously embedded in systems to be circular. The design of product service systems accesses new consumption patterns and markets, which are based on services without compromises but also the conservation of resources. For designers, this entails the development of design concepts above and beyond product design, which accompany the product in its complete life cycle.

A multitude of users can benefit from new product service systems, while corresponding business models promise manufacturers a reliable income and customer loyalty. Moreover, when the product remains the property of the service provider, the path to the reuse of components and materials is short, and it is thus the manufacturer's responsibility to close the loop.

Once the system – in which high-grade products, components, or materials stay in a loop – has been put in place by the manufacturer or in cooperation with part-ners, then even a shorter service life can fulfill the objectives of a circular economy.

把一次性产品变为传家宝或者为一代人建造房屋！

Turn disposable products into heirlooms or build houses for just one generation!

循环
设计法则

CDR – Version 1.0 Product Design

Scorecard

项目 Project _____

产品材料 Product Materials

Ⓜ① **回收材料**
Recyclate

Ⓜ② **再循环能力**
Recyclability

Ⓜ③ **减少**
Reduction

产品部件 Product Components

Ⓚ① **可分离性**
Separability

Ⓚ② **模块化**
Modularity

Ⓚ③ **升级换代**
Update/Upgrade

产品系统 Product Systems

Ⓢ① **回收**
Take-back

Ⓢ② **重复使用**
Reuse

Ⓢ③ **服务**
Service

Scorecard

计分卡 说明 Instructions

对于每个法则，检查您完成的步骤，并在计分卡上标记它们。

For each rule, check your accomplished steps and mark them in the symbol on the scorecard.

步骤一 (●) 完成。
Step 1 fulfilled.

步骤二 (◠) 完成。
Step 2 fulfilled.

步骤一(●) 和步骤二 (◠) 完成。
Step 1 and 2 fulfilled.

步骤三 (◎) 完成。
Step 3 fulfilled.

所有步骤完成。
All steps fulfilled.

→ 原则上:如果步骤3完成了，那么步骤2也就完成了，因为它是的步骤3的必要条件。

→ In principle: If step 3 is accomplished, then step 2 is complete as it is a requirement for step 3.

的计分卡也可以在 idrv.org/cdr 中作为模板使用。
The scorecard is also available as a template under idrv.org/cdr.

用可再生材料或回收材料设计产品。

→ Ⓜ② 再循环能力
→ Ⓢ① 回收

Design the product out of renewable materials or recyclate.

→ Ⓜ② Recyclability
→ Ⓢ① Take-back

使用本地可用的资源或回收材料。

Locally available resources or recyclates are used.

该产品由50%以上的回收材料或可再生材料组成。

The product consists of more than 50% recyclate or renewable materials.

该产品由90%以上的回收材料或可再生材料组成。

The product consists of more than 90% recyclate or renewable materials.

使用可重复使用或可降解材料设计产品。

→ Ⓜ ③ 减少
→ Ⓚ ① 可分离性
→ Ⓢ ① 回收

Design the product out of reusable or degradable materials.

→ Ⓜ ③ Reduction
→ Ⓚ ① Separability
→ Ⓢ ① Take-back

不使用对人类健康或环境有害的材料。

Materials harmful to human health or the environment are excluded.

使用超过50%可以在生产过程中重复使用或可生物降解的材料。

More than 50% of the used material can be reused in the production process or is bio-degradable.

使用超过90%可以在生产过程中重复使用或可生物降解的材料。

More than 90% of the used material can be reused in the production process or is bio-degradable.

用很少的材料设计产品。

→ Ⓜ② 再循环能力
→ Ⓚ① 可分离性

Design the product with little material.

→ Ⓜ② Recyclability
→ Ⓚ① Separability

产品中包含的所有材料是可以获得的。

A list of all materials contained in the product is available.

产品中的所有材料都能被有效分离。不使用复杂的混合材料或复合材料。

All materials in the product can be efficiently separated. No complex material mixtures or composites are used.

该产品由少量材料组成，或者一旦制造商或合作伙伴收回产品，就可以将其分离成原本的材料。

The product consists of little material or can be separated into its original materials once the manufacturer or partner has taken the product back.

设计产品的可分离性。

→ Ⓜ③ 减少
→ Ⓢ① 回收
→ Ⓢ② 重复使用

Design the separability of the product.

→ Ⓜ③ Reduction
→ Ⓢ① Take-back
→ Ⓢ② Reuse

拆卸说明可在产品本身或数字说明上找到，以确保所有部件可以被高质量地回收。

Disassembly instructions are available on the product itself or digitally in order to ensure the high-quality recycling of all components.

组件之间的所有连接都很容易完全分离。

All connections between the components are easy to detach completely.

拆卸是自动化的或者和制造一样高效。

Disassembly is automated or as efficient as the manufacturing.

模块化设计产品。

→ Ⓚ③ **升级换代**
→ Ⓢ② **重复使用**
→ Ⓢ③ **服务**

Design the product modularly.

→ Ⓚ③ Update/Upgrade
→ Ⓢ② Reuse
→ Ⓢ③ Service

定义可更换的部件，并实现较长的使用寿命。

Replacement parts are defined and enable a long lifespan.

所有的功能单元都被划分在组件之间。

All functional units are divided between the components.

使用最少数量的组件实现最多的应用。

A minimum number of components is used in a wide range of product variants.

产品的设计更新和升级。

→ ⓀⓋ 模块化
→ ⓈⓌ 服务

Design updates and upgrades for the product.

→ ⓀⓋ Modularity
→ ⓈⓌ Service

制造商提供更新和升级，以便产品保持最新和有吸引力。

Updates and upgrades are offered by the manufacturer so that the product remains up to date and attractive.

产品组件按照公共标准或使用接口进行设计，这些接口可以通过标准化组件进行扩展。

The product components are designed in keeping with common standards or use interfaces that can be extended with standardized components.

由于产品数据及其设计易于访问，用户有权自行进行更新和升级。

Users are empowered to make updates and upgrades themselves as the product data and its design are easily accessible.

设计产品的回收过程。

→ Ⓜ② 再循环能力
→ Ⓚ① 可分离性
→ Ⓢ② 重复使用

Design the take-back process of the product.

→ Ⓜ② Recyclability
→ Ⓚ① Separability
→ Ⓢ② Reuse

该产品的设计是基于现有的可回收垃圾收集系统。

The design of the product is oriented upon existing systems for the collection of recyclable waste.

制造商或合作伙伴组织并提供产品回收。

The manufacturer or partner organizes and offers the product take-back.

对于所购买产品的退回提供激励措施，或者该产品仍然是制造商的财产。

Incentives for the return of purchased products are offered or the product remains the property of the manufacturer.

设计的产品和组件的重复使用。

→ Ⓚ① 可分离性
→ Ⓚ② 模块化
→ Ⓢ① 回收

Design the reuse of products and components.

→ Ⓚ① Separability
→ Ⓚ② Modularity
→ Ⓢ① Take-back

以数字的方式提供适当的维护和维修说明，并允许用户自行维修产品。

Instructions for adequate maintenance and repair are available digitally and empower users to repair the products themselves.

为二手市场的再利用和发展提出一个概念。

A concept for the reuse and development of a second-hand market has been prepared.

回收的产品进行再利用处理或组件重新集成到生产过程中。

The products taken back are processed for reuse or components are reintegrated into the production process.

将产品设计成服务。

→ ⓀⓇ 模块化
→ ⓀⓈ 升级更新

Design the product as a service.

→ ⓀⓇ Modularity
→ ⓀⓈ Update/Upgrade

制造商对产品的使用寿命负责。

The manufacturer assumes responsibility for the service life of the product.

该服务可使众多用户使用产品。

The service enables access to the product for a multitude of users.

该产品不出售，而只是提供其使用权限。

The product is not sold, rather only its use is offered.