

DESIGNING FOR CIRCULAR ECONOMY

ISO 9001 Design Requirements Can Help



Millions of designers globally have an immense opportunity to **change the world** from Linear to Circular, by designing products and services using the principles of **Circular Economy**

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Overview

All the time we utilize products and services that demand tremendous resources from the planet. Given that 70% of all greenhouse gas (GHG) emissions are associated with extracting and processing raw materials, transitioning to a more sustainable model of producing and consuming goods is essential¹.

Current Linear Economy model of “Take-Make-Use-Throw” is no longer sustainable. In a Circular Economy model, products are designed for durability, reuse and recyclability. And as much as possible, everything is reused, remanufactured and recycled back into a raw material which can be used to manufacture other products or as a last resort, disposed of in an environmentally friendly manner.

The Circular Economy principles involve:

- Designing environment friendly products by eliminating or minimizing waste and pollution;
- Designing products and materials so as to use them at their highest value;
- Designing for reuse or disassembly;
- Regenerating natural systems.

“Over 70% of a product’s lifecycle costs and environmental footprint is determined during its design phase”

– *“Frugal Innovation: How To Do More With Less”, N. Radjou and J. Prabhu*

It is obvious from the above that design of products and services is critical to go the Circular Economy way. Design affects almost all aspects of product or service lifecycle including procurement of raw materials, production methods, packaging, shipping, the way the product is used and disposed of at the end of its lifecycle.

Mr. Navi Radjou and Mr. Jaideep Prabhu, authors of “Frugal Innovation: How To Do More With Less” rightly argue that, “over 70% of a product’s lifecycle costs and environmental footprint is determined during its design phase”. Once implemented, it is hard to reverse the impacts of design decisions. Hence it is critical to incorporate the principles of Circular Economy in all aspects of product or service lifecycle.

Applying Design and Development Requirements for Circular Economy

There are many existing techniques available for designing products and services such as:

- Design Thinking;

¹ <https://www.iso.org/contents/news/2022/11/ambition-for-the-new-economy.html>

- ISO 9001 QMS – design and development related requirements;
- Design for Six Sigma etc.

Until recently, to a large extent, the main focus of the design techniques has been to address the needs and expectations of target customer segments. Focus on the environment aspects of the design has been very limited so far, resulting in the current Linear Economy model of “Take-Make-Use-Throw”.

ISO 9001 provides a readily available management system framework for designing and developing products and services using Circular Economy principles.

The international Quality Management System standard (ISO 9001) clause 8.3 provides a readily available management system framework for designing and developing products and services using Circular Economy principles. The design requirements are detailed, comprehensive, prescriptive, and can be widely used by an

organization of any type and size.

Designers may consider few additional questions from Circular Economy perspectives as below:

1. **ISO 9001 Requirement 8.3.2a – “Consider nature, duration and complexity of the design and development activities”**

Addressing this requirement from Circular Economy perspective can help Designers ask:

A. Will manufacturing of the product consume lots of natural resources?

For example, steel manufacturing uses huge amounts of coal, iron ore, and limestone and is one of the biggest producers of carbon dioxide. Can steel manufacturing be decarbonized or increase the percentage of steel production using the Electric Arc Furnace method using steel scrap or Direct Reduced Iron as main raw material.

B. Will production processes involve high amounts of GHG emissions?

For example, cement concrete production is the largest contributor, accounting for 4.5% of global GHG emissions². Can cement be produced using different technology which has lesser GHG emissions?

Brimstone Energy³, a start-up aiming to commercialize affordable carbon negative cement, has achieved breakthrough in cement production by producing carbon negative portland cement with carbon-free calcium silicate rock instead of limestone.

C. Will components used in assembly of the product involve buying materials which need to be mined?

For example, although electric cars emit fewer greenhouse gasses and air pollutants than petrol and diesel ones, lithium for manufacturing electric car batteries requires intensive mineral extraction that can create toxic soils and dust with high concentrations of heavy metals.

2. ISO 9001 Requirement 8.5.5b – “For Post Delivery Activities - consider the potential undesired consequences associated with its products and services”

Designers may consider asking the following questions:

A. How can we minimize emissions while the product is in use?

For example, heat generated by IT servers in a data centre. Facebook uses recycled heat to heat nearby homes in Odense, Denmark. The company claims that its servers are able to heat an expected 6,900 homes in the area⁴.

B. How to dispose of the product without endangering human health and harming the environment?

For example, batteries containing lead – a cumulative toxicant that affects multiple human body systems must be recycled as a hazardous waste at facilities that are equipped with engineering controls to minimize lead emissions⁵

² “Green Growth Avenues in the Cement Ecosystem” by Thomas Hundertmark, Sebastian Reiter and Patrick Schulze, McKinsey & Co., 16th Dec. 2021 article

³ <https://www.brimstone.energy/>

⁴ https://sustainability.fb.com/wp-content/uploads/2020/12/FB_Denmark-Data-Center-to-Warm-Local-Community.pdf

⁵ <https://www.who.int/publications/i/item/WHO-FWC-PHE-EPE-17.02>

C. Can the product serve as an input material for another product?

For example, cork and old newspapers are used for the facade of the buildings in The Circle House⁶ – the first circular housing project in Denmark.

3. ISO 9001 Requirement 8.5.5c – “Consider the nature, use and intended lifetime of its products and services”

Designers may consider asking:

A. How to prolong the useful life of the product?

For example, Bundles⁷ developed a pay-per-use business model, where instead of owning a washing machine a customer pays per machine cycle. This not only reduces the costs for the customer, but also extends the life of the machine.

B. What happens after the product has been used? Can it be repurposed for use?

For example, IKEA has opened the world’s first Second-hand IKEA Pop-up store in Eskilstuna, Sweden.

4. Additional Requirements in ISO 9001 to consider from Circular Economy perspective

In addition to the above-mentioned Design and Development related requirements, ISO 9001 standard has some more interesting requirements which can be considered from Circular Economy perspective such as:

- **Actions to address risks and opportunities (clause 6.1).**

Designers may consider environment related risks and opportunities for reuse of materials.

- **Organizations can encourage their suppliers or providers of outsourced services (clause 8.4) to adopt principles of Circular Economy.**

For example, accept only recycled packaging materials or minimize the use of plastics for packaging.

- **Use the identification and traceability requirements (clause 8.5.2) to trace the journey of materials being used to produce a product with the objective of determining**

⁶ https://gxn.3xn.com/wp-content/uploads/sites/4/2019/02/CircleHouse_ENG_2018.pdf

⁷ <https://bundles.nl/en/>

its carbon footprint. This can help to decide to choose the right material for circular design.

Conclusion

Designing products and services for the Circular Economy needs top management commitment to the environment, new ways of thinking about design, and adopting a proven framework for design with the supporting policies, processes, controls and resources to go the Circular Economy way.

Millions of Designers, be it Architects or product or service Designers, around the world have an immense opportunity to change the world and help it become more circular and fight climate change.



About the author

Mr. Sunil Thawani champions The United Nations Sustainable Development Goals (SDGs) 2030. He is a recipient of prestigious ASQ Lancaster Medal for his dedication and outstanding contributions to the International Fraternity of Quality Professionals. He lives in Abu Dhabi and can be reached at contact@qualityindeed.com



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