

Bachelor-Thesis Business Engineering | Innovation Circularity Assessment for Room Climate Devices Alex Selhofer

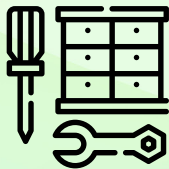
Purpose

Growing concern for the environment, pressure from stakeholders, and new regulations on CO2 emissions demand circular solutions for the manufacturing industry. Zehnder, a manufacturer of radiators and ventilation units, shares these concerns and is working to improve the circularity of its main product lines. Therefore, the current and possible future circularity of a ComfoAir Q 450 (CAQ 450) ventilation unit and a Volga+ radiator were assessed. In a second step, improvements were proposed that would lead to more circularity at component and product level.

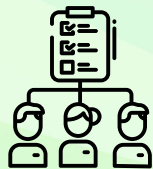
Methods and Competences



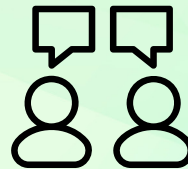
Value Hill



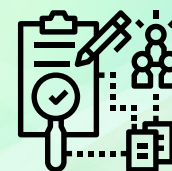
Disassembly



Questionnaires



Interview



Data Collection



Circularity Scoring

Based on the concept of the Value-Hill, which encompasses the 10R-Strategies of circularity, the currently performed R-Strategy for each component was researched, and possibilities for more circular R-Strategies were proposed. After conducting expert interviews, questionnaires, the disassembly of the assessed units, and an internal document analysis, results for each component group were found.

Result

The results of this thesis help Zehnder to increase the circularity of its current products, but will take full effect when adapted for the next generations of products. The main issue is the return of products from the end user to the manufacturer. This issue needs further research. Pilot projects, such as the reuse and refurbishment of high global warming potential (GWP) and high environmental footprint (EF) components, could be adapted to a wider range of components and require close collaboration with suppliers. Materials and assembly methods should be chosen according to circular design guidelines, taking into account concepts such as Design for Disassembly and Recycling. The Circularity R-Score (CRS) was measured by combining weight, GWP or EF score and current as well as the future R-strategy. The current circularity is similar for both products. The future circularity of the Volga+ is higher due to the overall refurbishment strategy for the whole unit, whereas for the CAQ450 the focus was on strategies for individual components.

	CRS		CRS GWP		CRS EF	
	Now	Future	Now	Future	Now	Future
CAQ 450	8.05	3.97	7.13	4.46	6.6	4.61
Volga +	8.11	3.53	8.01	3.12	8.00	3.06