Performing a Life Cycle Assessment of a self-checkout for Pan Oston

Public summary - Bachelor assignment Industrial Design Engineering
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Introduction

Pan Oston is a company that makes checkout solutions for the retail sector. Their products vary from belted-checkouts to self-checkouts and these can be found in most Dutch supermarkets and stores, but also in stores everywhere in Europe. Pan Oston only produces the metals housings of these products and the hardware, like scanners and printers, is provided by other companies.

As Pan Oston is a growing company, they have to report on their sustainability scores soon and want to work on their sustainability as a company. However, they have no idea how they are doing now when it comes to their environmental footprint. The goal of this assignment is to determine the CO_2 emissions of one of Pan Oston's products so this can be used as a baseline measurement for them. This is done by performing a Life Cycle Assessment (LCA) for the SLIM SCO Flat Small. This is a self-checkout from Pan Oston that is already used in stores. By performing a LCA, the amount of CO_2 produced by the product in its entire life cycle can be calculated. Also the weak points in the life cycle of the product that produces the most CO_2 can be discovered and based on that, improvements can be thought of and researched.

Fig. 1, SLIM SCO Flat Small

Research

The first phase of this study is finding the data that is needed to perform the LCA. This data contains the masses of the raw materials, the distance the materials have to be transported and the inputs and outputs of the production process. To collect all this data, a lot of conversations with employees of Pan Oston are held, research to the production processes is done and a Solidworks model has been analysed.

The data that has been collected in the first phase of the research, is then used in the GaBi model. Before the data is put into the model however, the model itself has to be made. The structure of the GaBi model can be seen in the overview in figure 2. The GaBi model consists of multiple plans, like the plan for the entire life cycle or the plan of the production phase, and these plans then again consist of plans and/or processes. A process could either be a raw material, like zincor, or an actual process like a production process or the assembly of the different parts.

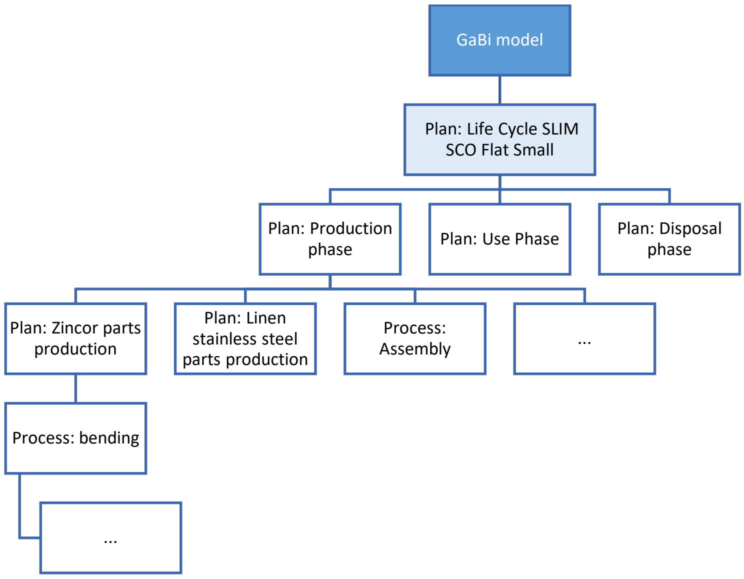

Fig. 2, structure of the GaBi model

The GaBi plan of the production phase can be seen in figure 3. In this figure, the division of the different parts is also clearly portrayed. The parts of the product are divided into the different materials. This division is made for an easier and more straightforward assessment. Next to those materials, a separate plan is made with the small, remaining parts. All these different parts are then assembled in the assembly process. This results in the complete product which then will continue to the use phase and the disposal phase.

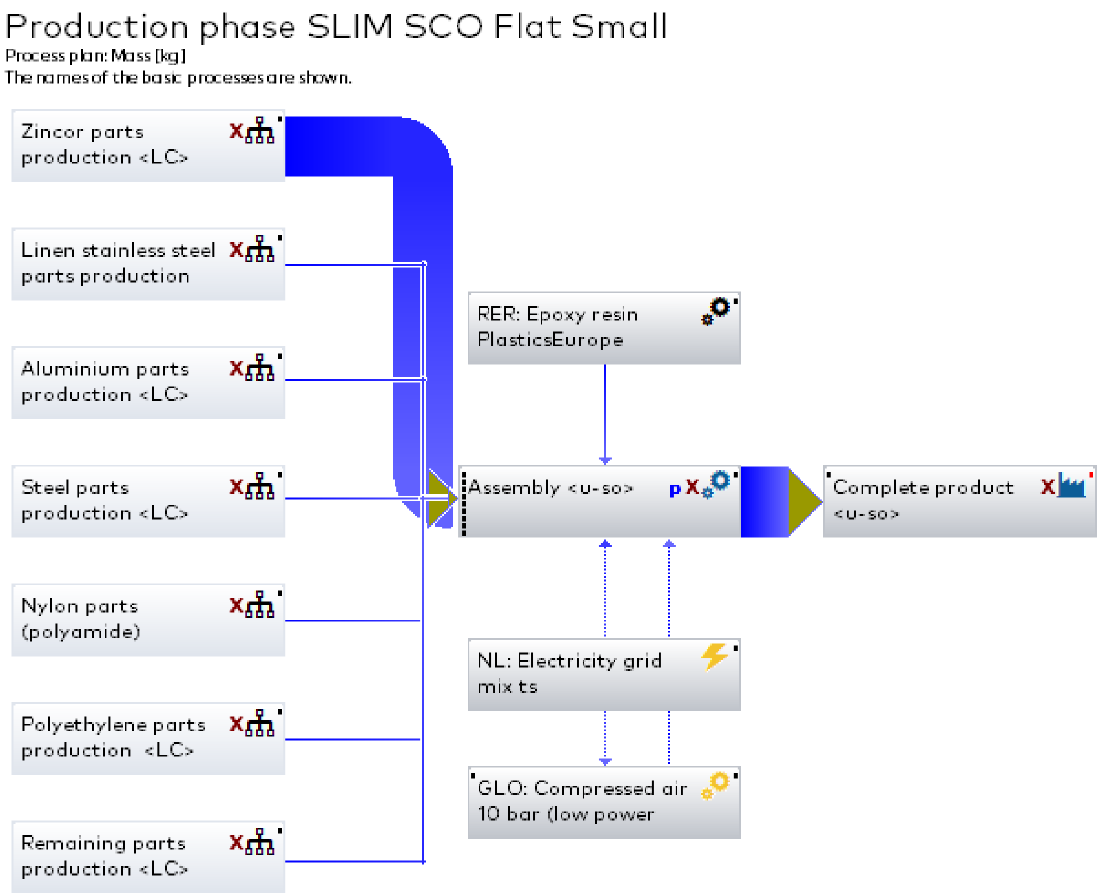

Fig. 3, GaBi plan production phase

After the GaBi model is finished, all the data is put in the model and the GaBi software does all the calculations. From these calculations, GaBi makes graphs and tables showing the results of the assessment. For this study, the climate change (CO_2 emission) is the most relevant aspect to look at and therefore the choice is made to only look at the climate change in the analysis of the results. In figure 4, it can be seen that the total CO_2 emissions of the entire life cycle of the SLIM SCO Flat Small are equal to 488 kg CO_2 eq. The score of 488 kg CO_2 eq. is equal to the following:

- A flight from Amsterdam to Malta for one person
- 19,5 jeans
- 97,6 hours of showering
- 24,4 kg beef
- 6,1 smartphones

(Boelsums, 2022)

What also can be seen in the same figure, is that the production phase produces the most CO_2, then the disposal phase and lastly the use phase. In the production phase, the energy used and the production of the raw zincor contribute the most to the high emissions. Based on these results, a few possible improvements were found. These improvements include using thinner zincor, using solar energy in the production and using recycled zincor. To know if these improvements actually work, more research has to be done.

	Life Cycle SLIM	Disposal Phase	Production ph	Use Phase SLI
Flows	**488**	**105**	**372**	0,299
Emissions to air	**488**	**105**	**372**	0,299
Inorganic emissions to air	**456**	**98**	**348**	0,259
Carbon dioxide	453	96,9	346	0,255
Carbon dioxide (aviation)	0,0023	0,00126	0,00104	4,95E-007
Nitrogentriflouride	0,000164	8,57E-005	7,84E-005	1,88E-008
Nitrous oxide (laughing gas)	3,51	1,13	2,3	0,00443
Sulphur hexafluoride	1,51E-006	5,57E-007	9,5E-007	4,08E-011
Organic emissions to air (group VOC)	**31,4**	**6,62**	**24,3**	0,0394
Group NMVOC to air	**1,52**	-0,0361	**1,56**	1,82E-006
Methane	28,4	5,97	21,9	0,0392
Methane (biotic)	1,52	0,693	0,794	0,000157

Fig. 4, results GaBi

Conclusions

In this research, it is discovered that the CO_2 emission of the SLIM SCO Flat Small from Pan Oston is 488 kg CO_2 eq. Possible improvements to reduce this number are using thinner zincor, solar energy and recycled zincor. It is recommended that Pan Oston researches these options better to know how much of a change they actually make and if they're possible to implement.

References

Boelsums, R. (2022). Hoeveel is 1 kilo CO_2? *Simpel Duurzaam*. https://simpelduurzaam.nl/duurzame-zorgverzekering/