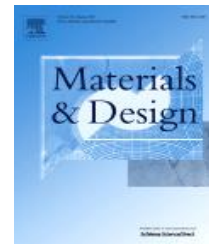


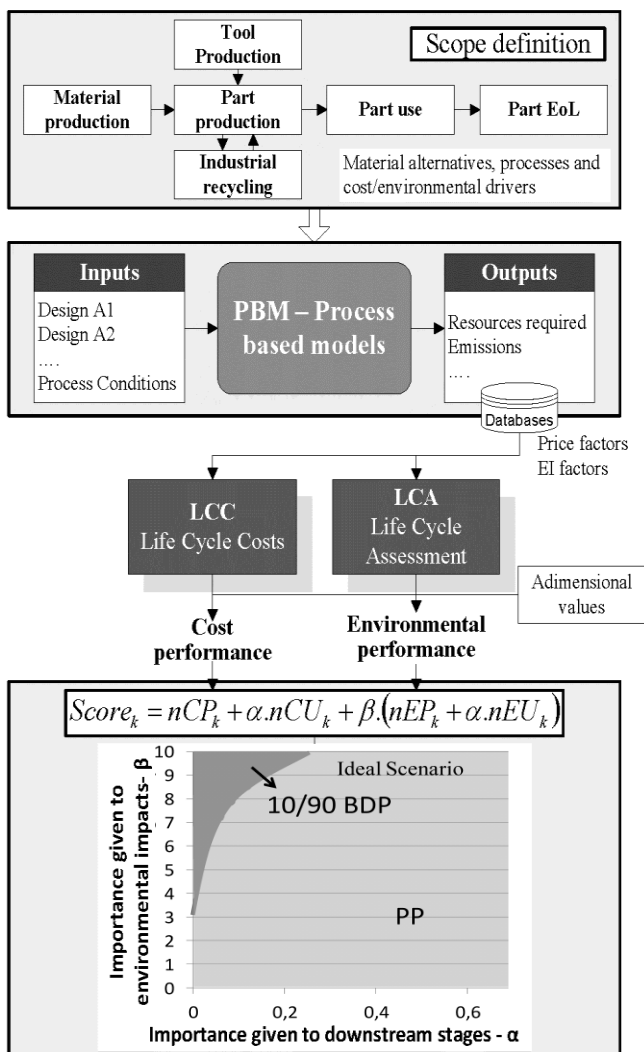


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Abstract: Nowadays society compels designers to develop more sustainable products. Ecodesign directs product design towards the goal of reducing environmental impacts. Within Ecodesign, materials selection plays a major role on product cost and environmental performance throughout its life cycle. This paper proposes a comprehensive life cycle framework to support Ecodesign in material selection. Dealing with new materials and technologies in early design stages, process-based models are used to represent the whole life cycle and supply integrated data to assess material alternatives, considering cost and environmental dimensions. An integrated analysis is then proposed to support decision making by mapping the best alternative materials according to the importance given to upstream and downstream life phases and to the environmental impacts. The proposed framework is applied to compare the life cycle performance of injection moulded samples made of four commercial biodegradable polymers with different contents of Thermo Plasticized Starch and PolyLactic Acid and a common fossil based polymer, Polypropylene. Instead of labelling materials just as “green”, the need to fully capture all impacts in the whole life cycle was shown. The fossil based polymer is the best economic alternative, but polymers with higher content of Thermo Plasticized Starch have a better environmental performance. However, parts geometry and EoL scenarios play a major role on the life cycle performance of candidate materials. The selection decision is then supported by mapping the alternatives.

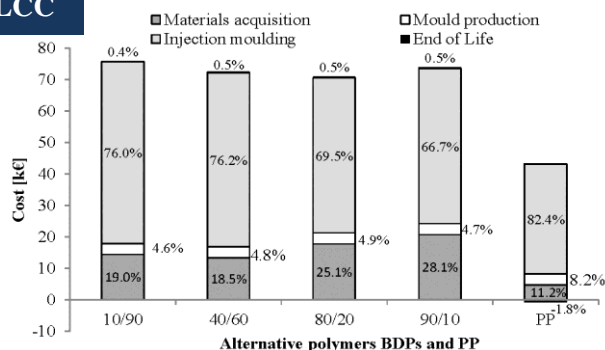
Comprehensive life cycle framework



Specific costs and environmental impacts of the material

Material	Unit Cost [€/kg]	EI'99 [points/kg]
10/90	2.64	0.09
40/60	2.30	0.16
80/20	3.12	0.26
90/10	3.50	0.28
PP	1.16	0.33

LCC



LCA

