

Remanufacturing and Product Design

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Design for Remanufacture

Remanufacture, the process of returning used goods to an "as-new" condition with a warranty to match can result in significant reductions in CO₂ emissions and potential energy savings of 85% (Steinhilper, 2006) and has been identified as a potential contributor to sustainable development (OHL, 2004). Remanufacturing is an industry worth £5 billion per year in the UK (OHL, 2004) but despite the new business models it can create and reputed double profits compared to manufacture the actual practice of remanufacture is limited (Gray & Charter, 2007).

Design for Remanufacture infers both business model and detailed product design. On the product level Design for Remanufacture can prevent inefficiencies in remanufacture by altering physical characteristics and is one of several strategies which may increase remanufacturing practice. Nasr and Thurston (2006) state that the full societal benefits of remanufacturing cannot be achieved unless Design for Remanufacture becomes an integral part of the product development process. However, there is currently little or no Design for Remanufacture being practised due to a lack of OEM engagement in remanufacture and designers' lack of awareness of eco-design, let alone Design for Remanufacture.

Design for Remanufacture is a combination of Design for X strategies that can optimise the process of remanufacturing, common examples include Eco-Design, Design for Upgrade and Design for Disassembly. Hammond et. al's survey of American automotive remanufacturers (1998) and Sundin (2004) reveal some trends in the difficulties of remanufacture, which Design for Remanufacture may be able to resolve:

- Product complexity
- Fastening methods for assembly and disassembly
- Increased part fragility and wear resistance
- Ease of identification and handling

Relevant Design for X strategies are likely to be product-specific and relative to the physical characteristics of that product. Disassembly concerns often impact on several of the remanufacturing stages and Design for Disassembly is therefore one of the most fundamental steps. Additionally, Product Service Systems (PSS) can be usefully incorporated to enable the OEM to collect 'core' (the products or components to be remanufactured).

Wax RDC's approach to Design for Remanufacture

Wax encourages its OEM partners to take advantage of the business model of remanufacture and incorporates Design for Remanufacture into its design process. Examples of Wax's work include "Footnote" infants' footwear, which was designed in association with Clarks and incorporates PSS and remanufacture; and "Meo" a handset designed for Mioteq, which incorporates a new business model with a two-tier lease system. Meo's business model will allow the first generation to be upgraded into the second and this process is facilitated by Design for Disassembly. Design for Disassembly is key to enabling reuse and as such Wax is also working with Active Disassembly



Research Ltd to research, generate and prove cost-effective methods of disassembly to aid reuse and remanufacture.

Conclusion

PSS and remanufacture have long created ongoing revenue streams for OEMs such as Xerox and Caterpillar, alongside reduced production costs and significant environmental savings. As such remanufacture, optimised by Design for Remanufacture shows encouraging potential as an enabler of sustainable prosperity.

References and sources

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